

Phase (check one)	Type (check one)
<input type="checkbox"/> Initial Site Investigation	<input type="checkbox"/> Work Scope
<input type="checkbox"/> Corrective Action Feasibility Investigation	<input type="checkbox"/> Technical Report
<input type="checkbox"/> Corrective Action Plan	<input type="checkbox"/> PCF Reimbursement Request
<input type="checkbox"/> Corrective Action Summary Report	<input type="checkbox"/> General Correspondence
<input type="checkbox"/> Operations & Monitoring Report	

## **INITIAL SITE INVESTIGATION**

### **CALEDONIA OIL COMPANY BULK OIL STORAGE FACILITY**

**Site # 94-1630  
Main Street (Route 5)  
Lyndonville, Vermont**

**October 18, 1994**

A Facility Owned by:

#### **THE CALEDONIA OIL COMPANY**

99 Main Street  
Lyndonville, Vermont 05851  
(802) 626-9052

Prepared by:

#### **THE JOHNSON COMPANY, INC.**

100 State Street, Suite 600  
Montpelier, Vermont 05602  
(802) 229-4600

## EXECUTIVE SUMMARY

Historic releases of oil have apparently occurred at the site now known as the Caledonia Oil Bulk Oil Storage Facility, located east of North Main Street, Route 5, Lyndonville, Vermont. A remedial system which was constructed by Caledonia Oil Co. has been in operation for several years. This system reportedly consists of a recovery well and several radial recovery trenches.

A preliminary subsurface investigation was performed by The Johnson Company during June, 1994 to assess the nature and extent of subsurface contamination resulting from the historic releases. The preliminary investigation consisted of groundwater level measurement, groundwater mapping and laboratory testing of groundwater. These data, presented in a July 1994 report by The Johnson Company indicated that subsurface soils and groundwater had been contaminated by #2 oil in the vicinity of the site, and that the indicated direction of groundwater flow was toward the east.

Based upon their review of the results of the preliminary investigation, the State of Vermont Hazardous Material Management Division recommended that additional subsurface investigations be performed to more completely ascertain the extent of the contamination that was encountered.

The Johnson Company performed these additional subsurface investigations during August and September of 1994. The additional investigations consisted of performance of five soil borings, installation of five additional groundwater monitoring wells, additional water level measurements and groundwater mapping, and laboratory testing of additional soil and groundwater samples.

The results of these additional investigations confirm that the soils and groundwater are contaminated with fuel oil constituents and that the aerial extent of this contamination is very limited.

No nearby buildings, water supplies or surface waters appear to be currently at risk of contamination from this contamination.

Based upon the findings and conclusions of this additional work we recommend that continued remedial measures be undertaken to limit the migration of the contaminant plume in groundwater, and to reduce the level of contamination in the vadose zone and groundwater. We recommend that the existing product pumping well be fitted with a product removal pump so that free product recovery efforts may continue. Additional groundwater monitoring of nearby monitoring wells is recommended on a quarterly basis. A pilot test of soil vapor extraction and possibly air sparging is recommended to test the viability of this method to remove volatile contaminants from the vadose zone.

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## 1.0 INTRODUCTION

Historic releases of oil have apparently occurred at the site now known as the Caledonia Oil Bulk Oil Storage Facility ("the site"), located east of North Main Street, Route 5, Lyndonville, Vermont (Figure 1). A free product recovery system which was constructed by Caledonia Oil Co. has reportedly been in operation for several years. This system consists of a recovery well and several radial recovery trenches according to the owners.

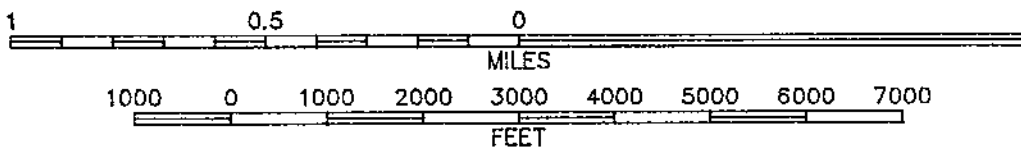
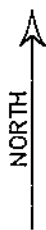
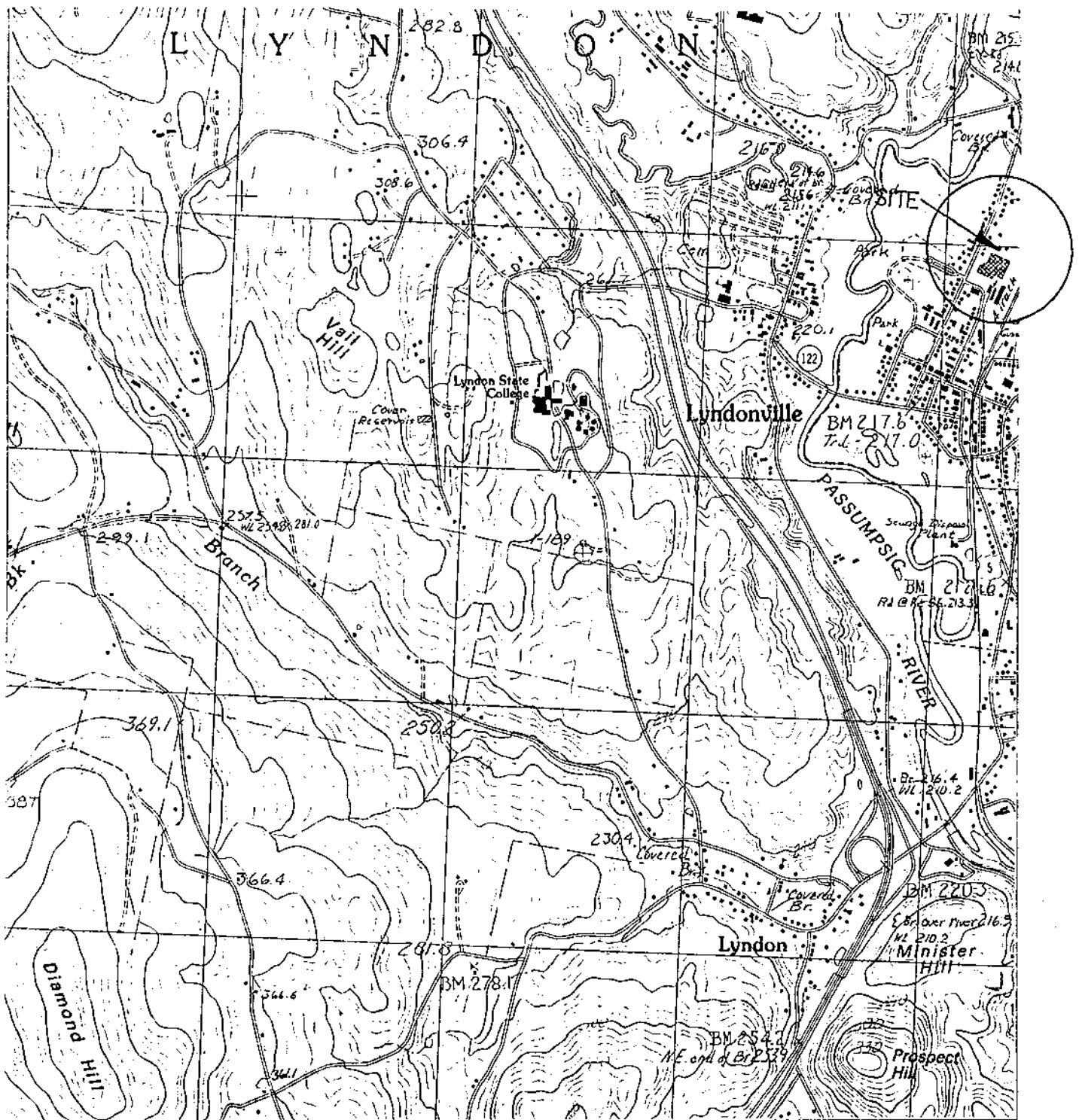
The Bulk Oil Storage Facility consists of six above-ground storage tanks surrounded by containment structures, and a fueling station. There are several buildings, storage tanks, and other structures at the site also (see Plates 1 (A-C)).

The Johnson Company was retained to investigate the nature and extent of contamination beneath site and to recommend future actions. Five soil borings and five groundwater monitoring wells were installed at the site during this investigation. This is in addition to three soil borings and groundwater monitoring wells and one recovery well which were previously installed. A fourth soil boring and monitoring well was installed in 1989 near the recovery well location, it is presumed that this well was destroyed when the recovery well was installed. Laboratory analytical results from soils and groundwater obtained during the preliminary site investigation indicated that contamination of soils and groundwater was present at the site, however, the magnitude of the contamination was limited (Caledonia Oil Company Report, prepared 7/12/94 by The Johnson Company).

The Johnson Company submitted a workplan for additional investigations to the HMMD on July 28, 1994. The HMMD approved this workplan with two conditions in a letter dated August 3, 1994 (Attachment 1). The Johnson Company has completed these additional investigations, and the results thereof are presented in Section 2.0; the resulting remedial recommendations are presented in Section 3.0 of this report.

## 2.0 METHODOLOGY

The work that was performed during the additional investigation at the site included: Advancement of five soil borings, field screening of recovered soils for volatile organic compounds, installation of five additional groundwater monitoring wells, collection and laboratory analysis of 6 soil samples and 6 groundwater samples, investigation of the construction of the existing remedial system, and several rounds of groundwater level measurement. A sensitive receptor survey was performed in conjunction with the Calmart site investigation (see "Initial Site Investigation, Calmart Gas Station", The Johnson Company, 10/7/94, DEC Site #94-1621).



CONTOUR INTERVAL 20 FEET



BASE MAP : USGS 7.5 Minute Topographic Quadrangle: Lyndonville, VT (Provisional Edition 1986).

FIGURE 1 : Site Location Map  
Calendonla Oil  
Lyndonville, Vermont

**THE JOHNSON COMPANY, INC.**  
Environmental Sciences and Engineering  
100 STATE STREET MONTPELIER, VT 05602

## 2.1 SOIL BORINGS

Five soil borings were advanced at the site on August 24 and 26, 1994 by Tristate Drilling and Boring, Inc. of West Burke, Vermont. The Johnson Company provided oversight of the soil boring work. The five new soil borings are labelled as JCO-1, JCO-2, JCO-3, JCO-4 and JCO-5. The locations of these additional borings, as well as of previously-installed soil borings and monitoring wells, are shown on the Site Plan (Figure 2 and Attachment 2). Detailed soil boring logs are included in Attachment 3.

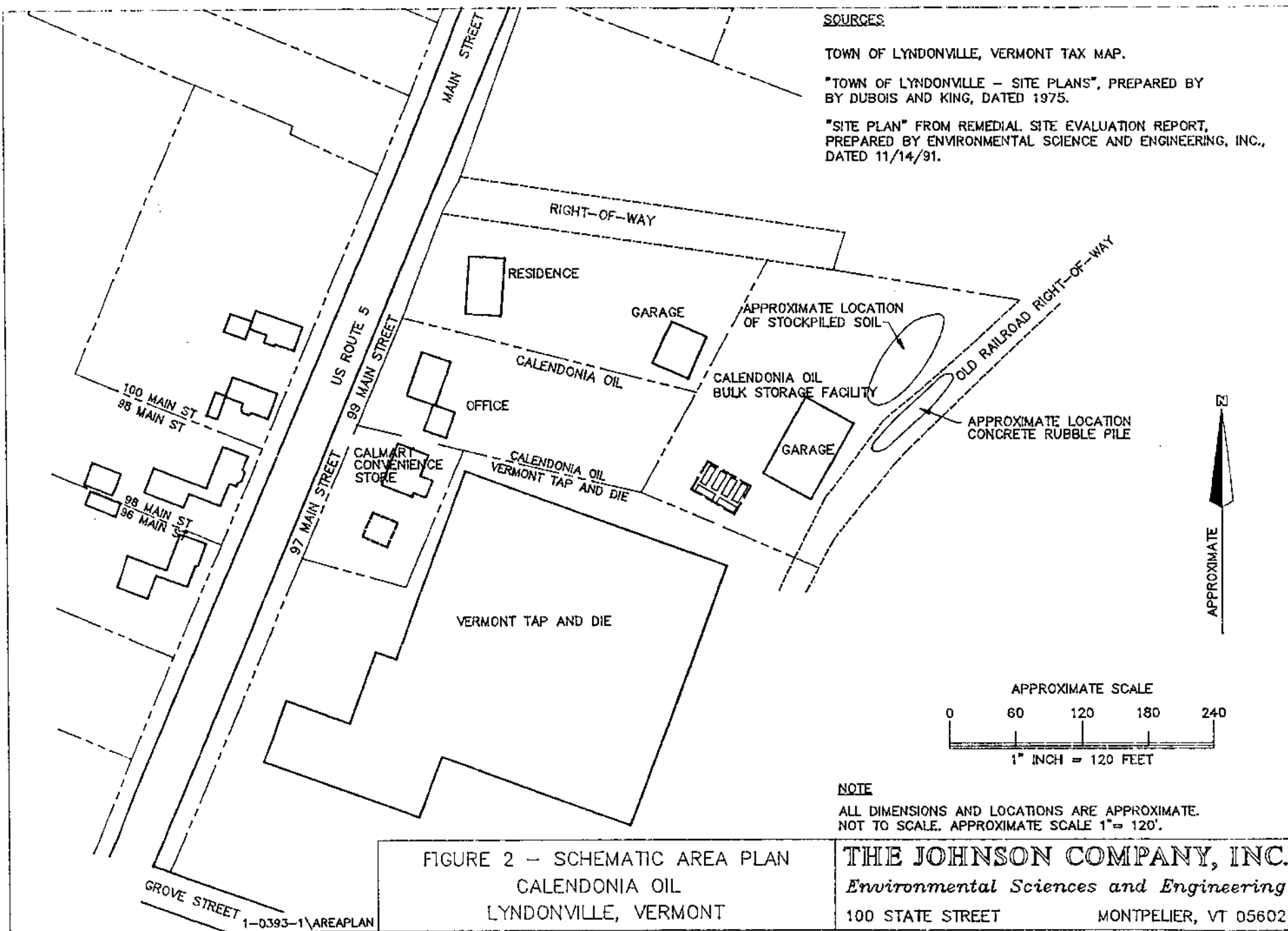
### 2.1.1 Subsurface Stratigraphy

The additional soil borings that were advanced at the site indicate a widely-variable stratigraphy over short distances. Soil borings JCO-2 and JCO-4 were advanced through a former railroad bed fill area, while soil borings JCO-1, JCO-3 and JCO-5 were advanced in native soil covered by fill soils. Previously installed soil borings now labelled CAL-1, CAL-2, CAL-3 and "Destroyed MW", confirm the fill-over-native soil sequence (see Attachment 3).

The data retrieved from these soil borings as well as from the previously-installed soil borings and logs of borings on the adjacent Vermont Tap and Die property (ESE, "Phase II Report and Corrective Action", March 31, 1994) indicates a probable lacustrine silt/clay unit to the western portion of the site covered by thin fill. It appears that this unit is truncated by an erosional contact which trends northwest-southwest. To the east of this contact the depth to the silt/clay unit is unknown; the silt and clay was probably removed by stream erosion and was subsequently replaced by a fluvial cut-and-fill sandy sequence. These relationships are depicted on the cross-sectional diagrams included in Attachment 2.

### 2.1.2 Soil Sampling and Field Screening Methods/Results

Split spoon sampling was performed continuously during the advancement of the soil borings. A calibrated OVM 580B photoionization detector (PID) with a 10.2 eV lamp was used to perform bag headspace measurements on soils collected from the split spoon sampler during the advancement of the soil borings. The PID was calibrated to 101 ppm isobutylene gas each day before use. In the bag headspace method, a reclosable bag filled half with soil and half with air is sealed and is allowed to equalize for several minutes; then the vacuum tip of the PID is inserted into the bag so that a sample of the air in the bag is drawn into the ionization chamber. The number of molecules of volatile chemical in the chamber is estimated by the machine and this is theoretically proportional to the total number of molecules of volatile chemical in the soils. PID measurements are good relative indicators of the severity and distribution of contamination beneath the ground, but they do not convert directly to actual chemical concentrations and they do not identify which chemicals are present. Laboratory analytical tests are required to accomplish these goals, see Section 2.1.2.



The PID measurements collected during the advancement of soil borings JCO-4 and JCO-5 indicated the presence of potential soil contamination. The magnitude of volatile vapors was generally low, from 0-11.5 ppmV. In JCO-4, the highest PID measurements were obtained immediately below the ground surface and decreased with depth. In JCO-5, the results ranged up to 6.5 ppmV at a depth of 7-9' bgs. Background PID measurements of less than 0.8 ppmV were reported from soil borings JCO-1, JCO-2 and JCO-3. Soil borings JCO-4 and JCO-5 are located south of the above-ground tank farm and proximate to Vermont Tap and Die, while JCO-1, JCO-2 and JCO-3 are located west and north of the above-ground tanks. This may indicate that the elevated PID measurements obtained in JCO-4 and JCO-5 may be due to either the past usage of the Caledonia property or to contaminant migration from the Vermont Tap and Die property; a "solvent odor" was reported by the geologist who logged soil boring JCO-4 from the interval 5-7' bgs.

### 2.1.3 Laboratory Analytical Results - Soils

Soil samples were collected from selected portions of the soil borings during their advancement. One soil sample was collected from each soil boring except for JCO-4, from which two soil samples were collected. Specific sample locations and test results are presented in Table 2-1. Laboratory results are in Attachment 4.

TABLE 2-1 REPORTED LABORATORY TEST RESULTS FROM SOIL SAMPLES. CALEDONIA OIL BULK STORAGE FACILITY				
Sample	Depth of Collection (Elevation)	Soil Type	Reported TPH Value (type)	PID Measurement at Same Location
JCO-1	5'-7' bgs (704.5' - 706.5')	clay, silt, fine sand	BPQL	0.2 ppmV
JCO-2	4'-6' bgs (705.2' - 707.2')	m-c sand, gravel, cinders-fill	33 mg/kg (#2 fuel oil)	0.8 ppmV
JCO-3	7'-9' bgs (698.2' - 700.2')	coarse sand, pebbles, gravel	BPQL	0.8 ppmV
JCO-4	7'-9' bgs (702.7' - 704.7')	silt, clay, some fine sand	BPQL	7.4 ppmV
JCO4-3	0'-3' bgs (708.7' - 711.7')	fine sand, silt, gravel, bricks	0.16 mg/kg BPQL (gasoline)	11.5 ppmV
JCO-5	5'-7' bgs (707.0' - 709.0')	coarse sand, some silt, fine sand	BPQL	3.0 ppmV



The results indicate that oil concentration of soils is limited to the area around JCO-2, and also presumably near the recovery well and monitoring wells CAL-1, CAL-2, and CAL-3. The gasoline contamination which is reported in shallow sample JCO-4-3 is presumably a surface release, with little subsurface effect.

## **2.2 GROUNDWATER MONITORING WELLS**

Five additional groundwater monitoring wells were installed simultaneously with the soil boring work. Groundwater monitoring wells were installed in soil borings at locations JCO-1, JCO-2, JCO-3, JCO-4 and JCO-5. Two inch PVC riser pipe and screens were used. Screens were 10 feet long with 0.010 inch slots except at JCO-1 where a 5-foot screen was used. Annular sandpack was placed to a depth of at least one foot above the top of the well screen in each well. A one-foot bentonite seal was installed over the sandpack to minimize stormwater inflow potential. A locking flush mounted roadbox was installed in a cement plug to complete each well. Well construction diagrams are included in Attachment 3.

## **2.3 GROUNDWATER SAMPLING & ANALYSES**

Groundwater samples were collected from groundwater monitoring wells at site on September 21, 1994. The sampled locations included all of the wells which contained water as of the date of sampling; these were: CAL-1, CAL-2, CAL-3, RW-1, JCO-2 and JCO-3. There was no water in JCO-1, JCO-4 or JCO-5 on the date of sampling. All groundwater samples were collected using the protocol established in The Johnson Company Standard Operating Procedure JCO-008. There was 0.32 feet free product in RW-1 on September 21, 1994. A sheen was noted on monitoring well CAL-1 on that date also.

All samples were chilled upon collection and were sent via Chain of Custody procedure to Friedman and Bruya, Inc., an analytical testing laboratory located in Seattle, Washington. There, analysis of the water samples was undertaken using EPA method 8270 for acid-base neutral extractable semi-volatile organic compounds. A copy of the laboratory report is included in Attachment 4. The reported analytical values obtained during this testing are summarized in Table 2-2 below. Prior laboratory test data for BTEX compounds in the same wells collected on June 16, 1994 is presented in Table 2-3.

TABLE 2-2  
LABORATORY REPORTED COMPOUNDS IN GROUNDWATER  
MONITORING WELLS - CALEDONIA OIL 9/21/94

Location	Parameter	Conc. ( $\mu\text{g}/\ell$ ) 9/21/94	VT GWES $\mu\text{g}/\ell$	VT HA $\mu\text{g}/\ell$
CAL-1	Naphthalene	6	----	20
	2-methylnaphthalene	7	----	----
	acenaphthene	1	----	----
	phenanthrene	1	----	----
	bis(2-ethylhexyl)phthalate	9*	----	6
	Total SVOC	24	----	----
CAL-2	Naphthalene	24*	----	20
	Acenaphthene	7	----	----
	Dibenzofuran	5	----	----
	Fluorene	8	----	----
	Phenanthrene	7	----	----
	bis-(2-ethylhexyl)phthalate	4	----	6
	Total SVOC	55	----	----
CAL-3	Naphthalene	6	----	20
	Fluorene	1	----	----
	Phenanthrene	1	----	----
	bis-(2-ethylhexyl)phthalate	2	----	6
	Total SVOC	10	----	----
RW-1	2-methylphenol	13	----	----
	2,4-dimethylphenol	15	----	----
	butylbenzophthalate	26	----	----
	bis(2-ethylhexyl)phthalate	55	----	6
	di-n-octylphthalate	52	----	----
	Total SVOC	148		

NOTES:

\* means exceedance of standards.

<sup>1</sup> Note: initial RW samples could not be quantified due to gross contamination, are being re-run.

<sup>2</sup> ---- means no GWES/HA value in existence.

GWES means State of Vermont Groundwater Enforcement Standards

HA means State of Vermont Health Advisory (only provided for compounds without an established GWES).

TABLE 2-3  
LABORATORY REPORTED COMPOUNDS IN GROUNDWATER  
MONITORING WELLS - 6/16/94

Location	Parameter	Conc. (µg/l) 6/16/94	VT GWES µg/l	VT GA µg/l
CAL-1	MTBE	BPQL (<25)	----	40
	Benzene	*9 <sup>1</sup>	5	---
	Toluene	8 <sup>1</sup>	2,420	---
	Ethylbenzene	4 <sup>1</sup>	680	---
	Total Xylenes	29 <sup>1</sup>	400	---
	Total BTEX	50	---	---
CAL-2	MTBE	BPQL (<25)	----	40
	Benzene	*19	5	---
	Toluene	<1	2,420	---
	Ethylbenzene	30	680	---
	Total Xylenes	5	400	---
	Total BTEX	54	---	---
CAL-3	MTBE	BPQL (<25)	----	40
	Benzene	*28	5	---
	Toluene	2	2,420	---
	Ethylbenzene	13	680	---
	Total Xylenes	6	400	---
	Total BTEX	49	---	---
RW-1	MTBE	BPQL (<25)	----	40
	Benzene	*440	5	---
	Toluene	480	2,420	---
	Ethylbenzene	67	680	---
	Total Xylenes	260	400	---
	Total BTEX	1,247	---	---

<sup>1</sup> Possible carryover due to high level sample ran prior.

GES = State of Vermont Groundwater Enforcement Standards

BPQL = Below Probable Quantitation Limit (amount indicated is the quantitation limit).

\* indicates laboratory reported concentrations above the GES.

GWES means State of Vermont Groundwater Enforcement Standards

HA means State of Vermont Health Advisory (only provided for compounds without an established GWES).

The reported testing results for groundwater samples indicate that the groundwater in the vicinity of monitoring wells CAL-1, CAL-2 and CAL-3 are contaminated with low concentrations of volatile and semivolatile organic compounds as would be anticipated for fuel oil contamination.

The laboratory data for June 1994 indicated that monitoring wells CAL-1, CAL-2, and CAL-3 were contaminated with low levels of BTEX compounds and that the recovery well was contaminated with moderate concentrations of BTEX compounds. These results are consistent with fuel oil contamination.

Figure 3 presents total reported VOC and SVOC concentrations by location in surficial groundwater as of June and September 1994. While data from different sampling dates are used, the low groundwater gradient and the nature of the contaminants probably have minimized dramatic changes in contaminant concentrations between June and September 1994. Lines of presumed equal VOC and SVOC concentrations were plotted based upon the reported test values. The contour lines, termed "Isopleth" lines, indicate that the contaminated groundwater is centered near Recovery well RW-1, and that this contamination falls off quickly with distance from RW.

#### 2.4 GROUNDWATER CONTOUR MAP

A groundwater contour map for the Bulk Oil Storage site was prepared and is presented in Attachment 2. Groundwater level measurements collected on September 21, 1994 were used in the preparation of this map. The groundwater elevation to the nearest 1/100 foot was then calculated by subtracting the measured depth to groundwater from the surveyed top of casing elevation for each well. The calculated groundwater elevation in each well was plotted on the site plan, then lines of equal groundwater elevation, termed "equipotential lines" were drawn based on the well data.

The equipotential lines for September 21, 1994 indicate an almost flat water table in the bulk plant vicinity. Earlier versions of this plan had indicated an eastward component of groundwater flow in the surficial aquifer, away from the Passumpsic River.

#### 2.5 SENSITIVE RECEPTORS

Based upon the results of this investigation it does not appear that any sensitive receptors (nearby basements, surface waters, etc.) have been or will imminently be threatened by this situation.

# NOTES

1) ALL DIMENSIONS AND LOCATIONS ARE APPROXIMATE.  
APPROXIMATE SCALE 1"= 30'.

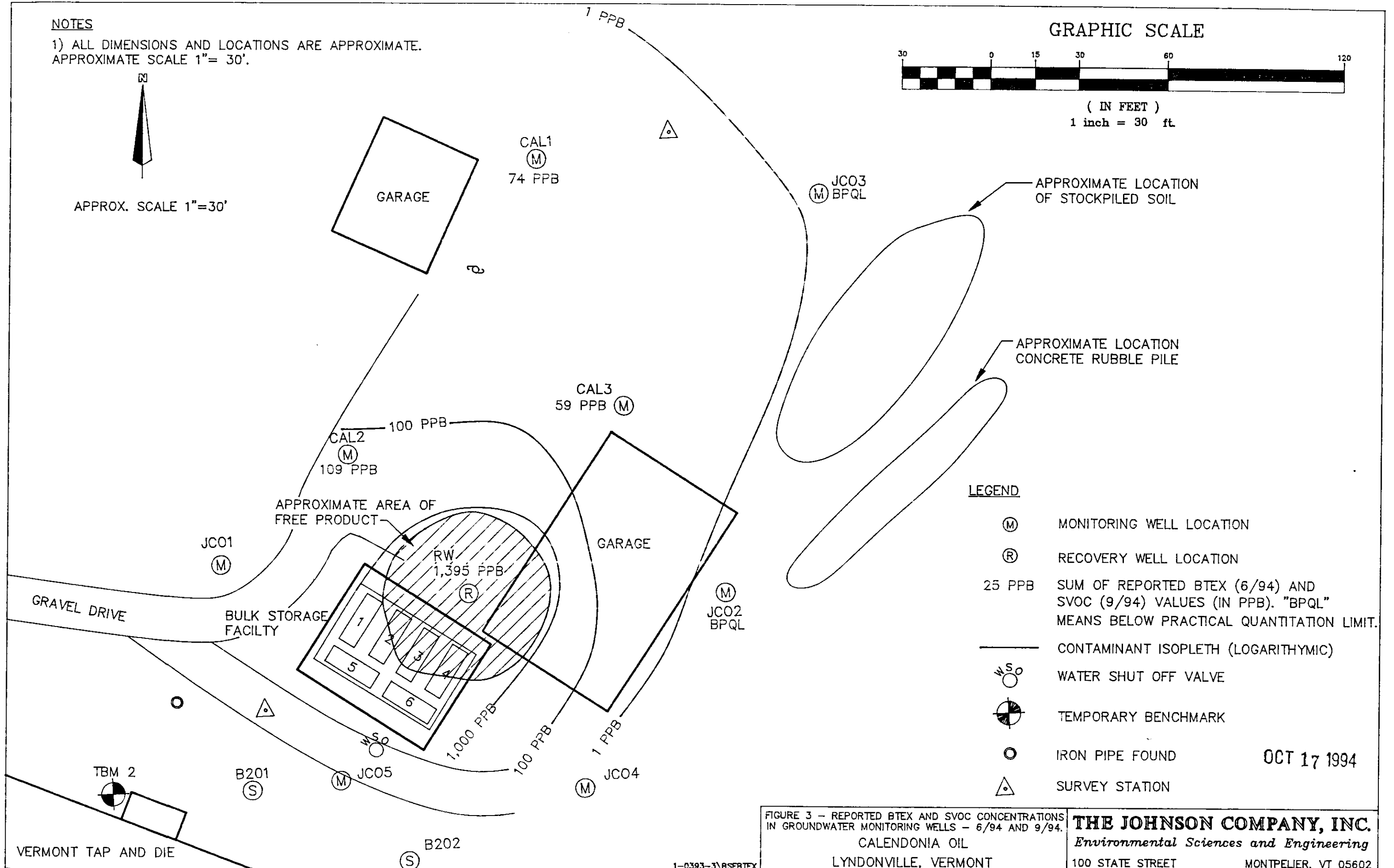


APPROX. SCALE 1"=30'

## GRAPHIC SCALE



( IN FEET )  
1 inch = 30 ft.



## 2.6 REMEDIAL SYSTEM CONSTRUCTION

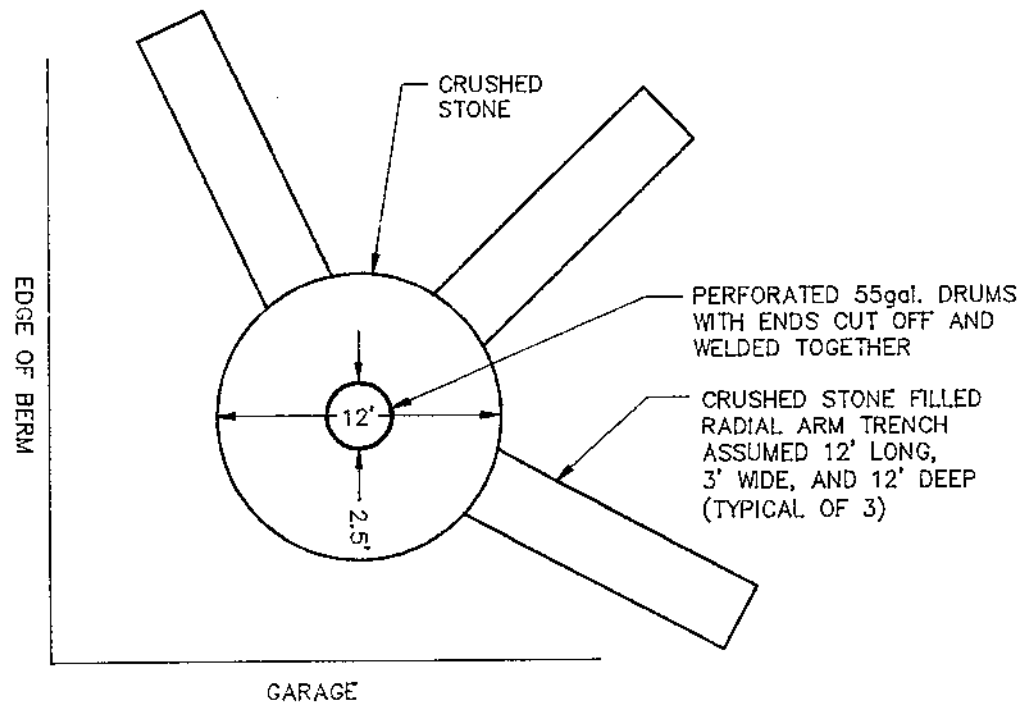
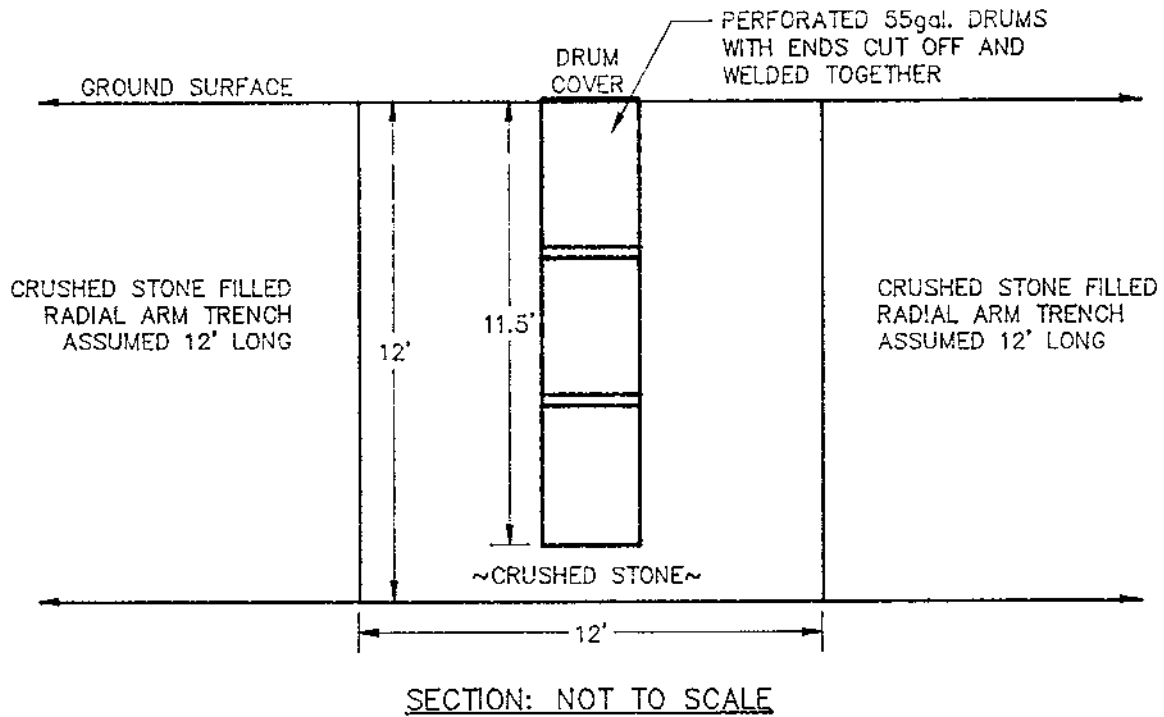
According to Ralph Devereaux, President of Caledonia Oil Company, a "recovery well" was established in 1987 by excavating a 12 foot diameter hole, approximately 12 feet deep with a track mounted excavator at the current location of RW-1. Three 55-gallon perforated steel drums, welded together end-to-end, were placed on end in the hole and the excavation was back filled with gravel to just below the current surface of the ground. The remainder of the excavation was back filled with native material. Three trenches were then excavated radially from the "recovery well" and then backfilled with gravel to enhance the recovery of free product. Figure 4 depicts the schematic design of the existing oil recovery system. A modified oil furnace pump with small-diameter metal tubing was used to remove free product from the well. This pump was manually switched "on" to remove product, and "off" when visual evidence of water entering the product was evident.

## 2.7 ESTIMATED REMAINING CONTAMINATION

Limited analytical data dictates that only conceptual estimates of remaining contamination beneath the site be advanced. The current database includes: several measurements of free product thickness at RW; one round of BTEX concentration data in monitoring wells and in the RW; one round of semivolatile organic compound data in five monitoring wells and the RW; and TPH data from six soil samples. These data indicate that a small free product plume exists around the RW and that limited soil and dissolved groundwater contamination exists beneath the site. We estimate that less than 1,000 gallons of hydrocarbon remain beneath the site based upon the following assumptions:

- A. Free product exists in a 30' radius circular zone around RW, at an average thickness of 0.1 feet and a soil porosity of 0.25 (500-600 gal.).
- B. Soil contamination in the vadose zone exists in a circular area approximately 90' radius, centered on RW; assumed 2' thick contaminated zone based upon "odor" reported during drilling and laboratory analytical results (33 mg/kg at JCO-2) (<20 gallons).
- C. Dissolved groundwater contamination is present in a circular area approximately 100' radius centered on RW; that a 10' thickness of contaminated groundwater is present, soils have a porosity of 0.25; average groundwater contamination in this zone is 50 ppb cumulative (<1 gallon).

Based upon information supplied by Caledonia Oil, it appears that the existing remedial system has removed at least half, and possibly as much as two-thirds, of the recoverable contamination that exists beneath the site.



SOURCE: CALENDONIA  
OIL COMPANY

FIGURE 4 - SCHEMATIC OF EXISTING  
REMEDIAL SYSTEM AT CALENDONIA OIL CO.  
IN LYNDONVILLE, VERMONT

**THE JOHNSON COMPANY, INC.**  
*Environmental Sciences and Engineering*  
100 STATE STREET MONTPELIER, VT 05602

### 3.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the additional investigations described above are that subsurface soils and surficial groundwater in the vicinity of the bulk plant are contaminated with fuel oil, and that the magnitude and aerial extent of this contamination is appears to be limited. No sensitive receptors appear to be at risk due to this situation.

Based upon the findings and conclusions of this additional work we recommend that continued remedial measures be undertaken to further limit contaminant migration and concentrations in the vadose zone and groundwater. We recommend that the existing product pumping well be fitted with a product removal pump so that free product recovery efforts may continue. Additional monitoring of nearby groundwater monitoring wells is recommended on a quarterly basis. A pilot test of soil vapor extraction and possibly air sparging is recommended to test the viability of this method to remove volatile contaminants from the vadose zone.

A pilot soil vapor (SVE) extraction test is recommended because it is a rapid and cost effective method to remove volatile contaminants from the vadose zone. A 36 hour pilot test is proposed to test for potential recovery airflow volumes, vapor concentrations in recovered air, and for zone of influence data.

We propose to utilize existing monitoring wells as vacuum wells for the test. The existing monitoring wells were specifically constructed for this eventually. An initial water level measurement round will be conducted to determine which of the wells have significant dry screened sections on the test date. A Rotron 1 hp single phase regenerative blower, with a no-load capacity of 100 scfm airflow will be connected using PVC pipe and Fernco flexible fittings first to those individual monitoring wells with significant dry screened sections to determine which wells produce the greatest mass recovery per unit time. If several wells produce significant airflow/vapor concentration results, then the second stage of the test will consist of vapor extraction from several monitoring wells connected together to determine whether interference effects would significantly reduce the potential for contaminant recovery via SVE. The data collected from the pilot test will be used to either design a full-scale weatherized SVE system or else to reject the concept as a remedial measure. We recommend that this test occur during the month of October 1994 to take advantage of relatively lower groundwater levels.



**ATTACHMENT 1**

**August 3, 1994 HMMD Letter**



# State of Vermont

Department of Fish and Wildlife  
Department of Forests, Parks and Recreation  
Department of Environmental Conservation  
State Geologist  
Natural Resources Conservation Council  
RELAY SERVICE FOR THE HEARING IMPAIRED  
1-800-253-0191 TDD>Voice  
1-800-253-0195 Voice>TDD

1-0393-3 KMY  
AGENCY OF NATURAL RESOURCES  
Department of Environmental Conservation  
Hazardous Materials Management Division  
103 South Main Street/West Office Building  
Waterbury, VT 05671-0404  
Phone: (802) 241-3888  
Fax: (802) 241-3296

August 3, 1994

RECEIVED

AUG - 6 1994

THE JOHNSON CO., INC.  
MONTPELIER, VERMONT

Karl Johnson  
Johnson Company  
100 State Street  
Montpelier, VT 05602

RE: Caledonia Oil Bulk Fuel Storage Facility, Main Street (Route 5), Lyndonville,  
Site # 94-1630

Dear Mr. Johnson:

The Sites Management Section (SMS) has reviewed the proposed Work Plan for the above referenced site. The SMS has reviewed the proposed work plan and is prepared to approve the work plan if the following modifications are incorporated:

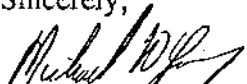
1. Section 2.1, Soil Borings: The SMS requests one additional soil boring/monitor well be installed. The well should be installed between the bulk tanks and the Vermont Tap and Die property. This boring/well should be installed in the same manner as the proposed borings/monitor wells.
2. Section 2.3, Groundwater Sampling: Groundwater samples should be analyzed for total petroleum hydrocarbons (TPH) by either 418.1 or EPA Method 8015 and polynuclear aromatic hydrocarbons (PAH) by either EPA Method 8100 or 8270.

The report should include a comprehensive description (narrative and system sketch) of the current remedial system and the effectiveness of the system as well as an estimate of the quantity of petroleum remaining in the soils.

In order to minimize investigation costs, Caledonia Oil has expressed interest in conducting this work at the same time as any additional work the SMS will require Caledonia Oil to conduct at the Caledonia Oil gas station site (Site # 94-1621). The SMS will make every attempt to comment on the portion of the report pertaining to the Caledonia Oil gas station site in order to allow Caledonia Oil to conduct both investigations concurrently. A work plan and cost estimate will need to be submitted to the SMS for any additional work that will be performed at that site.

If you have any questions or need further information please feel free to contact me at the phone, fax or address identified above.

Sincerely,



Michael W. Young  
Asst. Hazardous Materials Specialist  
Sites Management Section

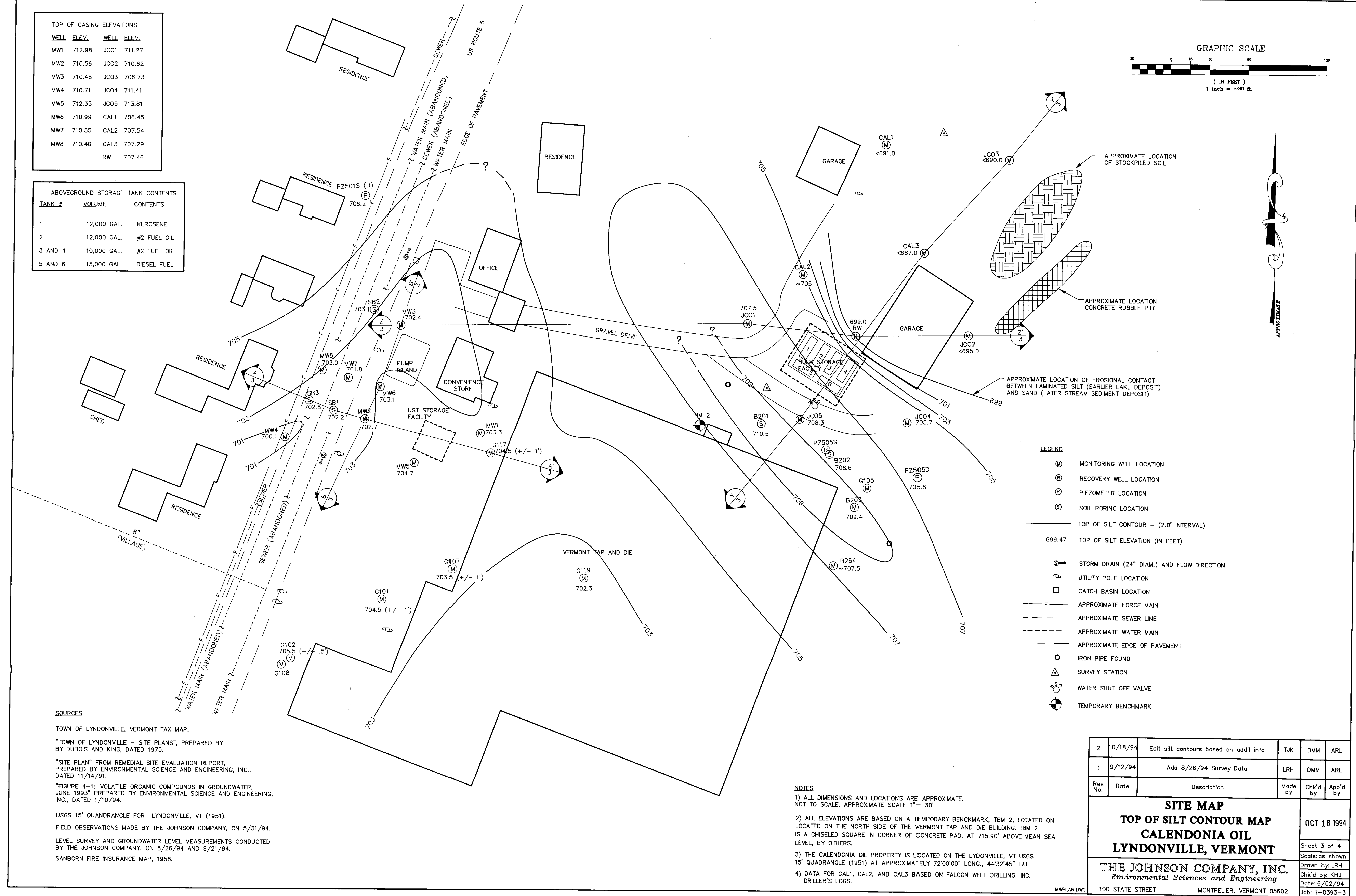
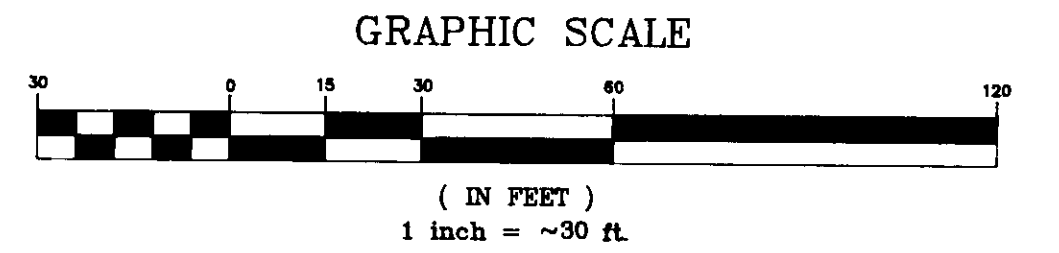
cc: Ralph Devereaux, Caledonia Oil  
Bob Martin, Primer & Piper

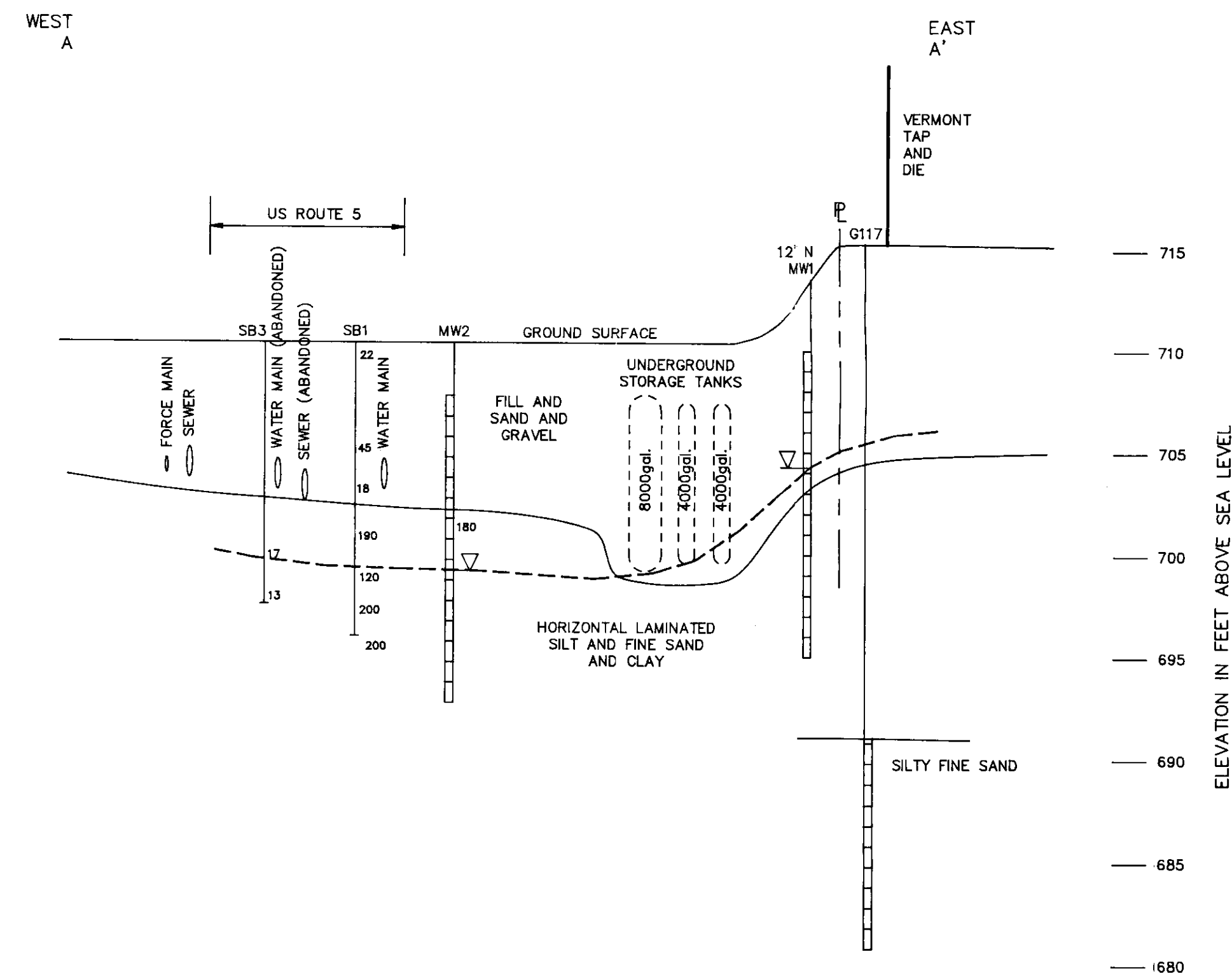
TOP OF CASING ELEVATIONS

WELL	ELEV.	WELL	ELEV.
MW1	712.98	JC01	711.27
MW2	710.56	JC02	710.62
MW3	710.48	JC03	706.73
MW4	710.71	JC04	711.41
MW5	712.35	JC05	713.81
MW6	710.99	CAL1	706.45
MW7	710.55	CAL2	707.54
MW8	710.40	CAL3	707.29
	RW		707.46

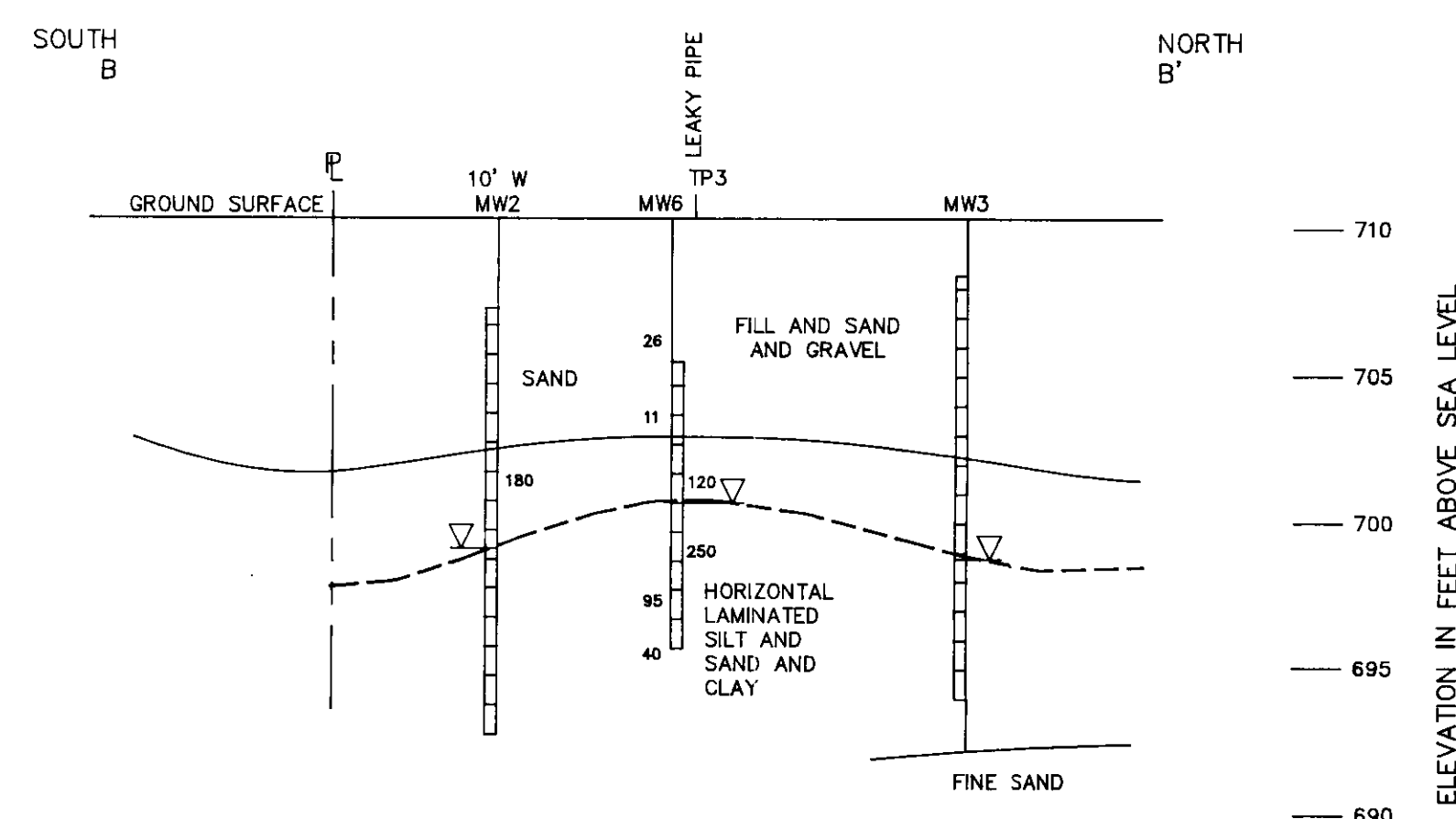
ABOVEGROUND STORAGE TANK CONTENTS

TANK #	VOLUME	CONTENTS
1	12,000 GAL.	KEROSENE
2	12,000 GAL.	#2 FUEL OIL
3 AND 4	10,000 GAL.	#2 FUEL OIL
5 AND 6	15,000 GAL.	DIESEL FUEL

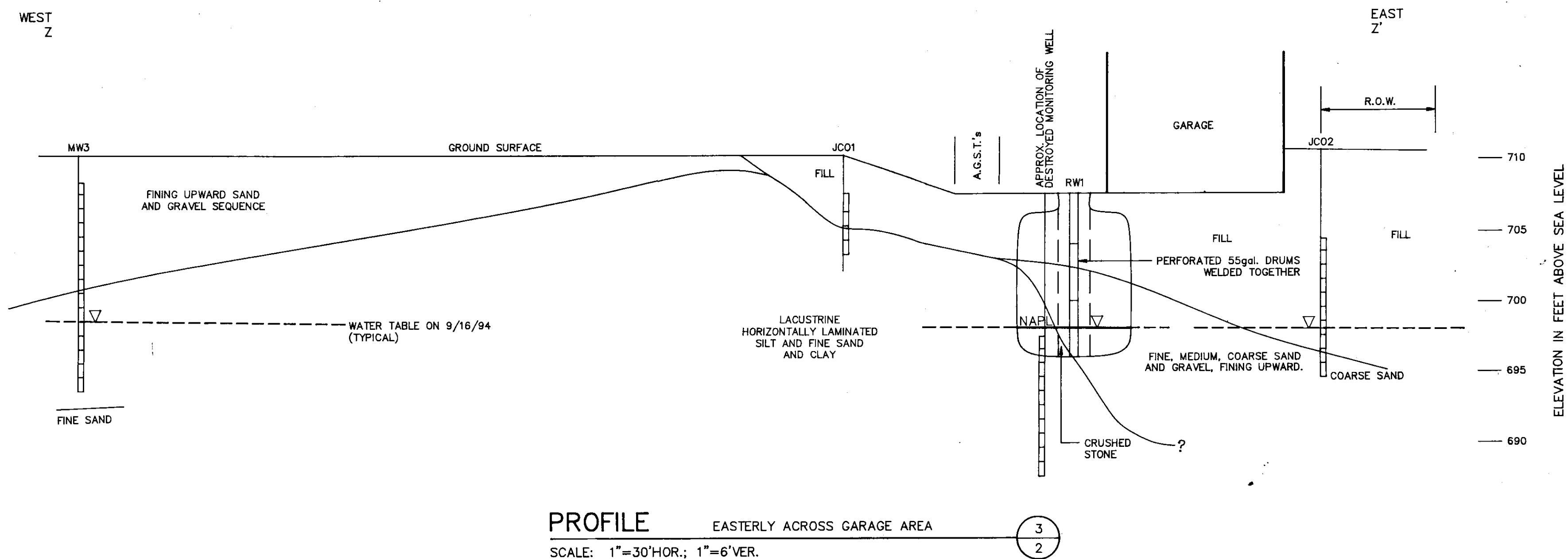




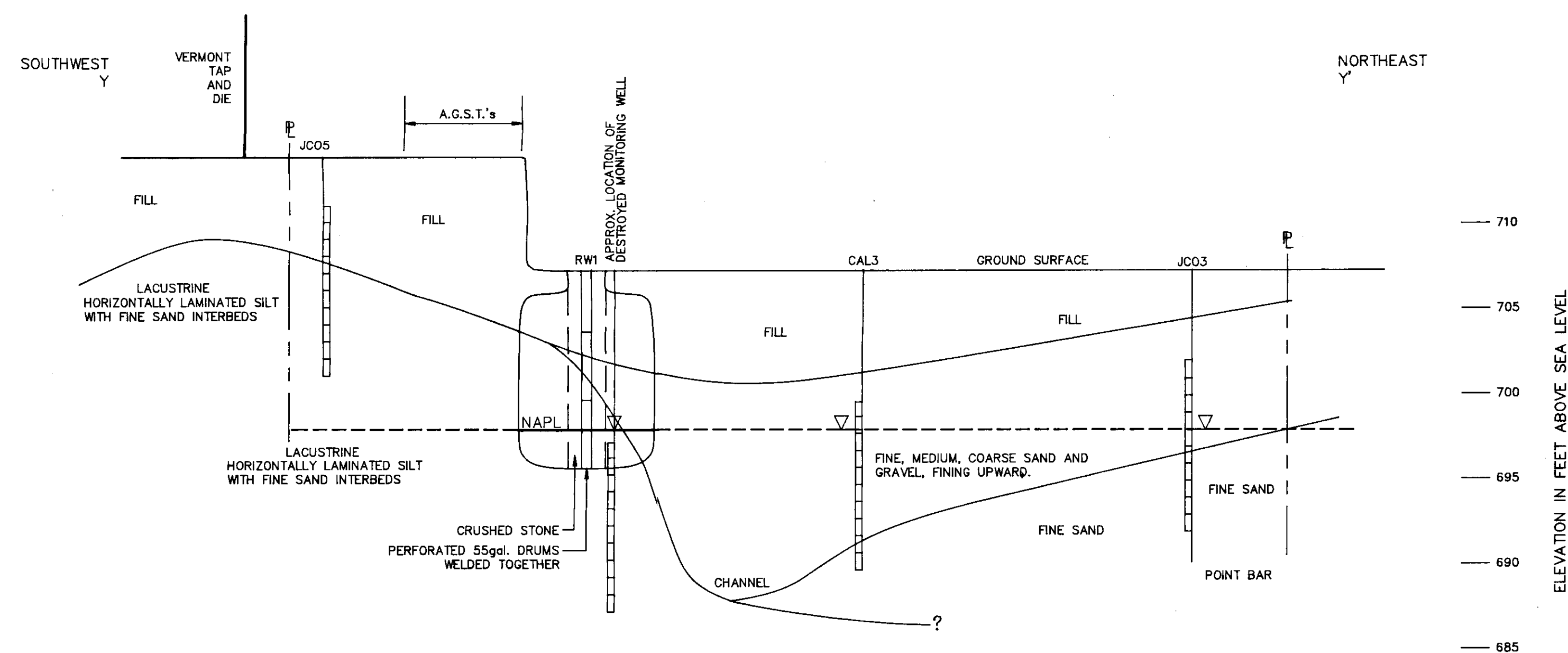
PROFILE 1  
EASTERLY ACROSS CALMART PROPERTY  
SCALE: 1"=30'HOR.; 1"=6'VER.



PROFILE 2  
NORTHERLY THROUGH CALMART PROPERTY  
SCALE: 1"=30'HOR.; 1"=6'VER.



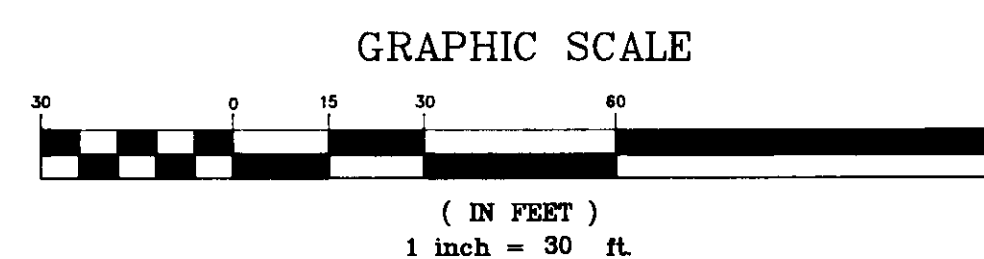
PROFILE 3  
EASTERLY ACROSS GARAGE AREA  
SCALE: 1"=30'HOR.; 1"=6'VER.



PROFILE 4  
NORTHEASTERLY THROUGH GARAGE AREA  
SCALE: 1"=30'HOR.; 1"=6'VER.

# KEY

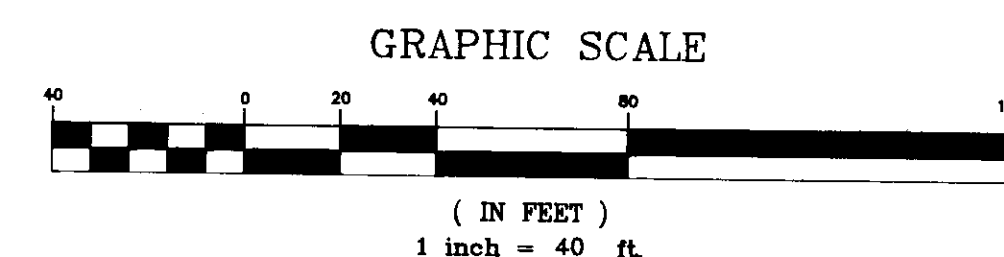
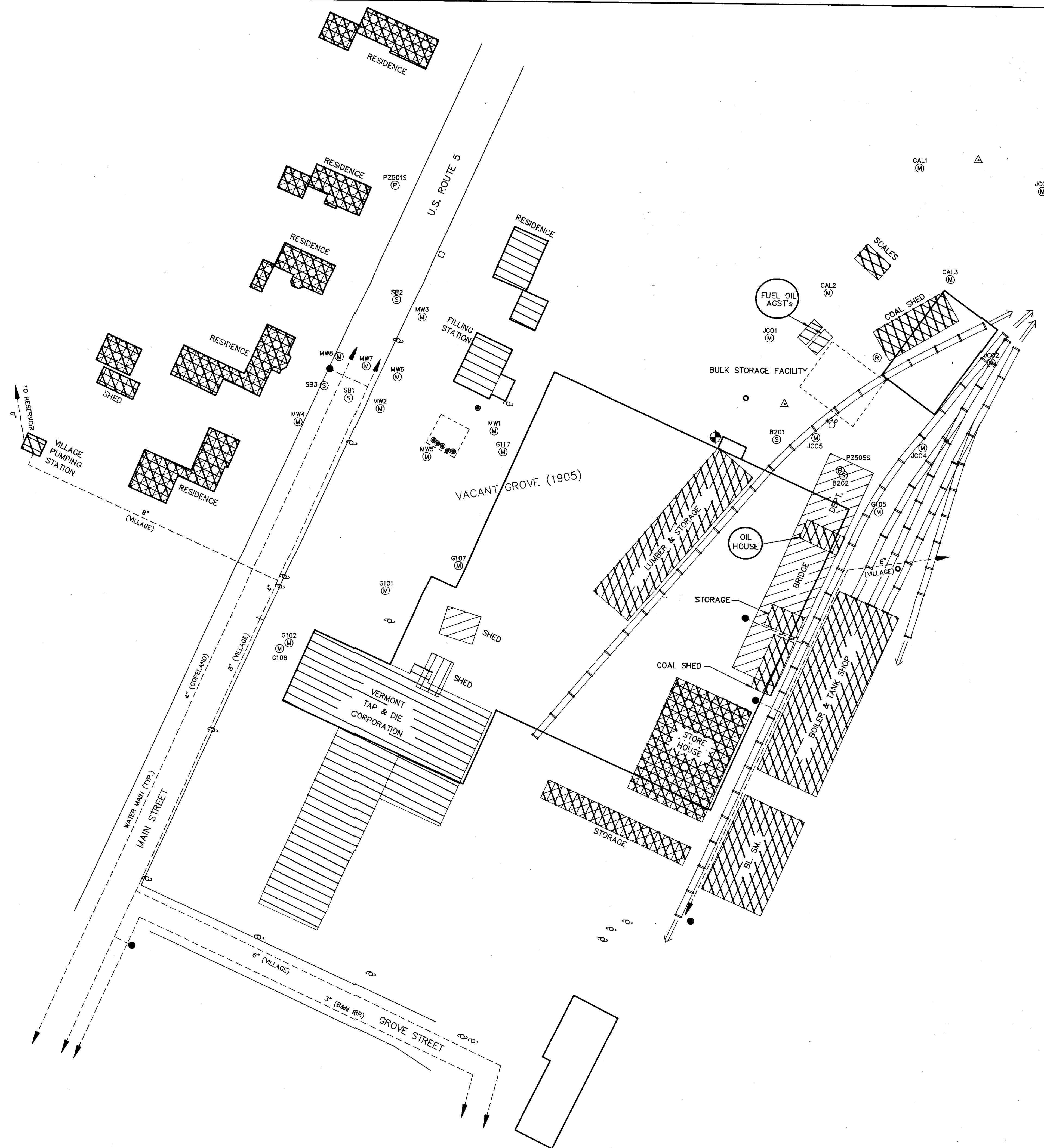
JC01 SAMPLE LOCATION ID  
PID HEADSPACE MEASUREMENT ABOVE 10 ppm  
WATER ELEVATION ON 9/16/94  
SCREENED INTERVAL



VERTICAL EXAGGERATION: 5:1

1	10/18/94	Edit Geology based on add'l info	TJK	DMM	ARL
Rev. No.	Date	Description	Made by	Chk'd by	App'd by
<b>GEOLOGIC PROFILES</b> <b>CALENDONIA OIL COMPANY</b> <b>LYNDONVILLE, VERMONT</b>					OCT 18 1994
<b>THE JOHNSON COMPANY, INC.</b> <i>Environmental Sciences and Engineering</i>					Sheet 2 of 4 Scale: as shown Drawn by: TJK Chk'd by: DMM Date: 9/29/94 Job: 1-0393-3
100 STATE STREET			MONTPELIER, VERMONT 05602		

PROFILES.dwg



#### LEGEND

- WATER SHUT-OFF VALVE
- UTILITY POLE
- SURVEY MONUMENT
- BENCH MARK
- SURVEY STATION
- VENT/FILL PIPE
- SOIL BORING LOCATION
- MONITORING WELL LOCATION
- PIEZOMETER LOCATION
- EXISTING BUILDING

#### KEY TO SANBORN MAP SOURCES\*

- |  |      |  |      |
|--|------|--|------|
|  | 1905 |  | 1922 |
|  | 1912 |  | 1958 |

- WATER MAIN W/CATCH BASIN
- RAILROAD TRACKS

\* NOTE: LOCATIONS AND DISTANCES APPROXIMATE

Rev. No.	Date	Description	Made by	Chk'd by	App'd by
<b>SITE PLAN WITH HISTORIC FEATURES CALENDONIA OIL COMPANY LYNDONVILLE, VERMONT</b>					
					OCT 18 1994
					Sheet 4 of 4
					Scale: 1"=40'
					Drawn by: TJK
					Chk'd by: DMM
					Date: 9/22/94
					Job: 1-0393-3

SITE.dwg

100 STATE STREET

MONTPELIER, VERMONT 05602

G116B  
G116A

## **ATTACHMENT 3**

### **Soil Boring Logs and Well Construction Diagram**

The Johnson Company, Inc.  
Environmental Sciences and Engineering  
100 State Street  
Montpelier, Vermont 05602

DRILLING LOG  
WELL # JCO-1

Project: Caledonia Oil  
Location: Route 5, Lyndonville, Vt.  
Job # 1-0393-3  
Logged By: DMM  
Date Drilled: 8/24/94  
Driller: Tri-state  
Drill Method: Hollow Stem Auger

Casing Type: PVC  
Casing Diameter: 2.0 in.  
Casing Length: 2.8 ft.  
Screen Type: PVC  
Screen Diameter: 2.0 in.  
Screen Length: 4.8 ft.  
Slot Size: 0.010"

Total Pipe: 7.8 ft.  
Stick Up: -0.3 ft.  
Total Hole Depth: 9.0 ft.  
Well Guard Length: 1.2 ft.  
Initial Water Level: 5.5 ft.  
Surface Elevation: 711.51  
T.O.C. Elevation: 711.27

■ = Sampled Interval

Sheet 1 of 1

Depth (feet)	Well Construction	Notes	Geology	PID Reading	Description
5					
4					
3					
2					
1					
0	Well Guard				
	Cement				
1	Bentonite			0.2	Brown dry fine and medium sand, some angular gravel, silt. (Fill).
2					
3					3-5' 11,7,5,5 No Recovery.
4	Sand Pack				
5					
6	Screen			0.2	5-7' 4,4,3,4 20" rec. Samples EPA 8015/8100. 0-2" Grey moist clay. Sharp horizontal contacts(SHC). 2-7" Brown moist silt & fine sand,SHC. 7-9" Grey wet laminated clay. 9-11" Brown wet fine sand & silt,SHC. 11-20" Grey wet massive silt & clay.
7				0.2	
8					
9					
10					7-9' 1,3,4,6 16" rec. 0-2" Grey laminated moist clay and silt,SHC. 2-8" Brown and grey saturated massive silt and fine sand,SHC. 8-15" brown sturated fine sand with 1/4" thick layers,SHC. 15-16" Grey damp laminated clay.
11					
12					
13					
14					
15					
16					
17					



The Johnson Company, Inc.  
Environmental Sciences and Engineering  
100 State Street  
Montpelier, Vermont 05602

DRILLING LOG  
WELL # JCO-2

Project: Caledonia Oil  
Location: Route 5, Lyndonville, Vt.  
Job # 1-0393-3  
Logged By: DMM  
Date Drilled: 8/24/94  
Driller: Tri-state  
Drill Method: Hollow Stem Auger

Casing Type: PVC  
Casing Diameter: 2.0 in.  
Casing Length: 5.9 ft.  
Screen Type: PVC  
Screen Diameter: 2.0 in.  
Screen Length: 9.7 ft.  
Slot Size: 0.010"

Total Pipe: 15.8 ft.  
Stick Up: -0.5 ft.  
Total Hole Depth: 16.0 ft.  
Well Guard Length: 1.2 ft.  
Initial Water Level: 11.7 ft.  
Surface Elevation: 711.16  
T.O.C. Elevation: 710.62

■ = Sampled Interval

Sheet 1 of 1

Depth (feet)	Well Construction	Notes	Geology	PID Reading	Description
5					
4					
3					
2					0-3' Black dry medium and coarse sand and gravel, some subangular pebbles. Mostly cinders.
1					
0	Well Guard				
	Cement				
1				0.6	Brown wet silt, some fine sand.
2					
3	Backfill			0.8	4-6' 2,1,2,6 11" recovery. Samples for EPA 8015/8100. Brown & orange & black wet medium and coarse sand, some subangular gravel, pebbles. Mostly cinders.
4					
5	Bentonite			0.8	6-8' 1,2,1,2 3" recovery. Cinders and bricks, some as above.
6					
7				0.8	8-10' 2,1,1,3 12" recovery. 0-4" Black wet cinders and bricks as above. Sharp horizontal contact (SHC). 4-12" Black silt and fine sand, some wood chunks.
8					
9				0.8	10-12' 2,2,3,3 12" recovery. Black, moist to wet, fine sand and silt and angular pebbles, and wood.
10	Sand Pack			0.8	
11					
12				0.4	12-14' 1,1,1,1 24" recovery. 0-12" Brown saturated fine sand and silt and angular pebbles and wood. Massive. SHC. 12-24" Grey wet horizontally laminated silt and fine sand.
13	Screen				
14				0.6	14-16' 1,3,3,2 15" recovery. 0-4" Grey saturated massive coarse sand. SHC. 4-15" Brown wet coarse sand grading down to fine sand.
15					
16					
17					

The Johnson Company, Inc.  
Environmental Sciences and Engineering  
100 State Street  
Montpelier, Vermont 05602

DRILLING LOG  
WELL # JCO-3

Project: Caledonia Oil  
Location: Route 5, Lyndonville, Vt.  
Job # 1-0393-3  
Logged By: DMM  
Date Drilled: 8/24/94  
Driller: Tri-state  
Drill Method: Hollow Stem Auger

Casing Type: PVC  
Casing Diameter: 2.0 in.  
Casing Length: 4.5 ft.  
Screen Type: PVC  
Screen Diameter: 2.0 in.  
Screen Length: 9.7 ft.  
Slot Size: 0.010"

Total Pipe: 14.7 ft.  
Stick Up: -0.4 ft.  
Total Hole Depth: 17.0 ft.  
Well Guard Length: 1.2 ft.  
Initial Water Level: 7.8 ft.  
Surface Elevation: 707.15  
T.O.C. Elevation: 706.73

■ = Sampled Interval

Sheet 1 of 1

Depth (feet)	Well Construction	Notes	Geology	PID Reading	Description
5					
4					
3					Brown humid fine sand, little silt.
2					
1					
0					
1	Well Guard				
1	Cement				
2	Backfill			0.8	3-5' 3,3,4,3 17" recovery. 0-6" tan dry massive fine sand. Horizontal gradational contact. 6-17" Tan dry medium sand grading down to coarse sand.
3	Bentonite				
4				0.8	5-7' 3,1,2,4 18" recovery. Brown dry coarse sand with faint horizontal bands of tan.
5					
6	Sand Pack			0.8	7-9' 6,8,11,12 12" recovery. Samples for EPA 8015/8100. 0-2" Brown damp massive coarse sand. Sharp horizontal contact (SHC). 2-12" Brown and orange coarse sand and gravel and subround pebbles. Wet at 7.5'.
7					
8				0.8	9-11' 6,7,3,1 12" recovery. 0-8" Orange wet poorly sorted gravel and subround pebbles. No preferential orientation, SHC. 8-12" Orange saturated clean fine sand.
9					
10				0.8	
11					
12	Screen			0.8	11-13' 1,0,1,1 12" recovery. 0-4" Orange saturated clean fine sand. SHC. 4-12" Grey saturated clean fine sand.
13	Backfill				
14				0.8	13-15' 1,1,2,1 14" recovery. Brown saturated horizontally laminated fine sand. Sand heaved to 11' bgs during well installation. Overdrilled to 17' without plug, and pushed well into place while pulling augers.
15					
16					
17					

The Johnson Company, Inc.  
Environmental Sciences and Engineering  
100 State Street  
Montpelier, Vermont 05602

DRILLING LOG  
WELL # JCO-4

Project: Caledonia Oil  
Location: Route 5, Lyndonville, Vt.  
Job # 1-0393-3  
Logged By: DMM  
Date Drilled: 8/26/94  
Driller: Tri-state  
Drill Method: Hollow Stem Auger

Casing Type: PVC  
Casing Diameter: 2.0 in.  
Casing Length: 2.7 ft.  
Screen Type: PVC  
Screen Diameter: 2.0 in.  
Screen Length: 9.7 ft.  
Slot Size: 0.010"

Total Pipe: 12.9 ft.  
Stick Up: -0.3 ft.  
Total Hole Depth: 13.2 ft.  
Well Guard Length: 1.2 ft.  
Initial Water Level: 12.4 ft.  
Surface Elevation: 711.66  
T.O.C. Elevation: 711.41

■ = Sampled Interval

Sheet 1 of 1

Depth (feet)	Well Construction	Notes	Geology	PID Reading	Description
5					
4					
3					
2					
1					
0	Well Guard				
	Cement				
1	Bentonite			11.5	0-3' Brown humid fine sand, some silt, some angular gravel, bricks. Sample for EPA 8015.
2					
3					
4				9.5	3-5' 6,8,10,8 4" recovery. Brown dry coarse sand and gravel and subround pebbles. poorly sorted, no preferential orientation. (Native?).
5					
6				8.5	5-7' 6,5,3,3 1" recovery. Pebble in tip. Solvent odor. Wet fine sand and silt and subangular gravel, pebbles.
7					
8	Sand Pack			7.4	
9					
10	Screen			4.5	7-9' 6,4,6,6 18" rec. EPA 8015 & 8100. 0-3" Grey saturated laminated silt, little fine sand, clay. Sharp horizontal contacts (SHC). 3-5" Grey moist lam. clay. 5-15" Grey sat. lam. silt and fine sand, SHC. 15-18" Brown sat. lam. fine sand.
11					
12				9	9-11' 4,5,5,7 20" recovery. 0-10" Orange and brown wet horizontally laminated fine sand. Few 1/8" thick silt layers. 10-20" Brown and orange massive fine sand.
13					
14					
15					
16					11-13' 16" recovery. red and brown saturated sharp horizontally laminated fine sand.
17					

The Johnson Company, Inc.  
Environmental Sciences and Engineering  
100 State Street  
Montpelier, Vermont 05602

DRILLING LOG  
WELL # JCO-5

Project: Caledonia Oil  
Location: Route 5, Lyndonville, Vt.  
Job # 1-0393-3  
Logged By: DMM  
Date Drilled: 8/26/94  
Driller: Tri-state  
Drill Method: Hollow Stem Auger

Casing Type: PVC  
Casing Diameter: 2.0 in.  
Casing Length: 2.8 ft.  
Screen Type: PVC  
Screen Diameter: 2.0 in.  
Screen Length: 9.7 ft.  
Slot Size: 0.010"

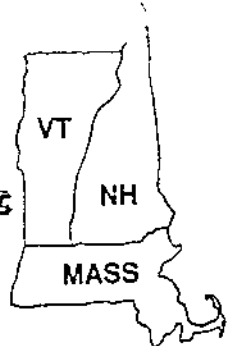
Total Pipe: 13.0 ft.  
Stick Up: -0.2 ft.  
Total Hole Depth: 13.1 ft.  
Well Guard Length: 1.2 ft.  
Initial Water Level: 6.0 ft.  
Surface Elevation: 713.98  
T.O.C. Elevation: 713.81

■ = Sampled Interval

Sheet 1 of 1

Depth (feet)	Well Construction	Notes	Geology	PID Reading	Description
5					Brown dry fine, medium, and coarse sand, some angular gravel.
4					
3					
2					
1					3-5' 4,3,3,5 18" recovery. 0-6" Brown dry horizontally laminated fine and medium sand, sharp horizontal contacts (SHC). 6-18" Brown and orange dry horizontally laminated (HL) medium and coarse sand.
0	Well Guard				
0	Cement				
1	Bentonite			0.8	
2					
3					5-7' 4,3,2,3 18" rec. Sample for EPA 8015/8100. 0-4" Brown dry medium and coarse sand, SHC. 4-8" Brown/grey dry coarse sand and gravel and subround pebbles. No preferred orientation. Poor sorting, SHC. 8-15" Grey wet HL silt, some fine sand.
4				1.5	
5					
6				3	
7					7-9' 3,3,1,3 18" recovery. 0-8" Grey wet silt grading down to horizontally laminated fine sand. Sharp lower horizontal contact. 8-15" Grey wet HL silt.
8	Sand Pack			6.5	
9					
10	Screen			3.0	
11					9-11' 1,1,1,1 24" rec. 0-1" Brown & orange wet fine sand, SHC. 1-2" Grey moist HL clay, SHC. 2-16" Grey saturated HL silt, some fine sand, SHC. 16-20" Grey moist HL clay. 20-24" Grey saturated HL silt and fine sand.
12				1.2	
13					
14					11-13' 2,2,4,4 18" rec. 0-1" grey wet clay, SHC. 1-12" Brown & orange HL, saturated fine sand, some silt. Gradational lower contact. 12-18" Grey saturated silt, some fine sand.
15					
16					
17					

**Tri State  
Drilling &  
Boring  
Inc.**



KHS, PTD  
JUN 14 1994  
THE JOHNSON COMPANY  
☐ monitor wells  
☐ soil borings  
☐ shallow wells  
Office 802-467-3123  
Fax 802-467-8540

RFD #2, Box 113, West Burke, Vermont 05871

June 13, 1994

The Johnson Company  
Attn: Mr. Paul Daly  
5 State Street  
Montpelier, VT 05602

RE: Danville Grain and Caledonia Oil

Dear Mr. Daly:

Enclosed herewith please find the above referenced soil logs you requested.

Please let me know if we can further assist you in any way. These logs date back to 1989 and 1990.

If you have any questions, please feel free to contact me at your earliest convenience. Thank you.

Sincerely,

*Neal S. Faulkner/jal*

Neal S. Faulkner  
Vice President  
NSF/jal

Enclosures

*Locations identified  
Based on presence  
of petroleum + some  
measured + reported  
+ depths of wells  
DM*

well #

RW1

DEC 70, 45 55 400 FT

DRILLER'S WORKSHEETS

1979

~~2011~~ DESTROYED

WELL OWNER/NAME: Calidonia Oil DATE WELL STARTED: 8 21 COMPLETED: 8 21

LOCATION: ADDRESS Lyndonville shop ROAD: \_\_\_\_\_ TOWN: \_\_\_\_\_ STATE: VT

DRILLER: Neal HELPER: \_\_\_\_\_ MACHINE #: M 1

PROPOSED USE OF WELL: \_\_\_\_\_ DOMESTIC, \_\_\_\_\_ OTHER monitor CASING USED \_\_\_\_\_

WELL SIZE: \_\_\_\_\_ GPM WATER: \_\_\_\_\_ TOTAL DEPTH: 19 NO: \_\_\_\_\_ FEET \_\_\_\_\_ INCHES

STATIC WATER LEVEL: \_\_\_\_\_ DEPTH TO BEDROCK: \_\_\_\_\_

DRILLER'S REMARKS: \_\_\_\_\_

5' of gravel fill

3' of black sandy soil

12' of bluish fine silty sand

presence of fuel oil about 9'

\_\_\_\_\_

10' of screen

10' of riser

1 end plug

1 piece of filter sock

1 1/2 hrs of mt

WELL LOG:

DEPTH IN FEET		WATER BEARING	FORMATION DESCRIPTION						TYPE
FROM	TO		<input type="checkbox"/> SAND	<input type="checkbox"/> GRAVEL	<input type="checkbox"/> HARDPAN	<input type="checkbox"/> CLAY	<input type="checkbox"/> BEDROCK		
GROUND SURFACE			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

PERTINENT REMARKS: \_\_\_\_\_

Well 2

## DRILLER'S WORKSHEETS

CAL2 TOL 707.54  
65708.12WELL OWNER/NAME: California oil DATE WELL STARTED: 8-21 COMPLETED: 8-21LOCATION: ADDRESS Shop ROAD: \_\_\_\_\_ TOWN: Lynden STATE: OKDRILLER: Neal HELPER: \_\_\_\_\_ MACHINE #: M1

PROPOSED USE OF WELL: \_\_\_\_\_ DOMESTIC, \_\_\_\_\_ OTHER \_\_\_\_\_ CASING USED

WELL SIZE: \_\_\_\_\_ GPM WATER: \_\_\_\_\_ TOTAL DEPTH: 215?  
DM

STATIC WATER LEVEL: \_\_\_\_\_ DEPTH TO BEDROCK: \_\_\_\_\_

DRILLER'S REMARKS: \_\_\_\_\_

NO:	FEET	INCHES
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
TOTAL		

10' of screen

5' of riser

1 filter sock

1 end plug

1 hr mt

presence of fuel oil  
about 7-8'

## WELL LOG:

DEPTH IN FEET FROM	TO	WATER BEARING	FORMATION DESCRIPTION	TYPE
GROUND SURFACE	3		<input type="checkbox"/> SAND <input checked="" type="checkbox"/> GRAVEL <input type="checkbox"/> HARDPAN <input type="checkbox"/> CLAY <input type="checkbox"/> BEDROCK	705
3	15.		<input checked="" type="checkbox"/> SAND <input type="checkbox"/> GRAVEL <input type="checkbox"/> HARDPAN <input type="checkbox"/> CLAY <input type="checkbox"/> BEDROCK	Silt/ Bluish
			<input type="checkbox"/> SAND <input type="checkbox"/> GRAVEL <input type="checkbox"/> HARDPAN <input type="checkbox"/> CLAY <input type="checkbox"/> BEDROCK	
			<input type="checkbox"/> SAND <input type="checkbox"/> GRAVEL <input type="checkbox"/> HARDPAN <input type="checkbox"/> CLAY <input type="checkbox"/> BEDROCK	
			<input type="checkbox"/> SAND <input type="checkbox"/> GRAVEL <input type="checkbox"/> HARDPAN <input type="checkbox"/> CLAY <input type="checkbox"/> BEDROCK	
			<input type="checkbox"/> SAND <input type="checkbox"/> GRAVEL <input type="checkbox"/> HARDPAN <input type="checkbox"/> CLAY <input type="checkbox"/> BEDROCK	

PERTINENT REMARKS: \_\_\_\_\_



# FALCON

well drilling, inc.

P.O. Box 1315, Lyndonville, VT 05851

In New England  
1-800-DIG-WELL

SOIL PROBE LOG  
Sheet 1 of 2  
Probe No 2  
Location Lyndonville  
Vermont in Vermont  
1-800-235-WELL

CAL-1

\*\*\*\*\*  
CASING SAMPLER \* GROUNDWATER OBSERVATIONS  
\* Date Depth Casing Stabiliz-  
\* At ation Pd.  
\*  
TYPE HSA  
SIZE 6"  
Hammer  
FALL

toc  
706.45

Row

691

DATE STARTED: 4/24/90 DATE COMPLETED: 4/24/90

BLOW COUNTS					REC	DRILLER'S NOTES
Depth	6"	12"	18"	24"		
						0-8' Brown Sand, fine gravel
5.0'						Water 6.5'
						8-15' Gray sand/gravel. Well set 16'
10.0'						
15.0'						
20.0'						
25.0'						Materials used: 1 Bag Benseal
						10' Screen
						6' Riser
						Filter Fabric
30.0'						

Client Caledonia Oil company Driller Wade Baillargeon  
Job Location Lyndonville, VT Helper Brian Greenwood  
Engineer: NA Inspector NA





# FALCON

well drilling, inc.

P.O. Box 1315, Lyndonville, VT 05851

In New England  
1-800-DIG-WELL

## BOIL PROBE LOG

Sheet 2 of 2  
Probe No 1 CAL 3  
Location Lyndonville  
Vermont In Vermont  
1-800-235-WELL

\*\*\*\*\*  
CASING SAMPLER \* GROUNDWATER OBSERVATIONS  
\* Date Depth Casing Stadiliz-  
\* At tion Pd.  
\*  
TYPE HSA  
SIZE 6"  
Hammer  
FALL

TOL  
707.29  
66  
707.56

DATE STARTED: 4/24/90 DATE COMPLETED: 4/24/90

BLOW COUNTS					REC	DRILLER'S NOTES
Depth	6"	12"	18"	24"		
						0-6' Fill, gravel black petro in material.
5.0'						6'-16' Brown sand
10.0'						
15.0'						16'-20' Fine gray sand
20.0'						Well set at 18'
25.0'						Materials used: 1 Bag Benseal
30.0'						15' Screen
						3' Riser
						Filter Fabric

BOW  
< 687

Client Caledonia Oil Company

Driller Wade Baillargeon

Job Location Lyndonville, VT

Helper Brian Greenwood

Engineer: NA

Inspector NA

**ATTACHMENT 4**

**Laboratory Analytical Reports for Soil and Groundwater**

**FRIEDMAN & BRUYA, INC.**  
**ENVIRONMENTAL CHEMISTS**

Andrew John Friedman  
James E. Bruya, Ph.D.  
(206) 285-8282

3012 16th Avenue West  
Seattle, WA 98119  
FAX: (206) 283-5044

10393-3  
AKL

**TRANSMITTAL**

DATE: Oct 14/94

TO: Mont Lippack

COMPANY: The Johnson Company, Inc. PROJECT NAME/#: \_\_\_\_\_

FAX #: 802-229-5876 PHONE #: \_\_\_\_\_

FROM: Bruce Benson

We are sending you: ☐ Attached ☐ Under separate cover via \_\_\_\_\_

# Copies/Pages  
(including cover sheet)

Description

3

These are transmitted as indicated:

- ☐ For your use ☐ For review and comment ☐ For your signature and return  
☐ As requested ☐ As noted ☐ Other \_\_\_\_\_

Remarks: Sample R4 after cleanup

Original: Will Follow ☐ Will Not Follow ☐

**Friedman & Bruya, Inc.**

3012 16th Avenue West  
 Seattle, WA 98119  
 (206) 285-8282

**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53146
Client ID: RW	Date Analyzed: 10/13/94	Units: ug/L (ppb)

Phenol	<25
bis(2-Chloroethyl)ether	<5
2-Chlorophenol	<25
1,3-Dichlorobenzene	<5
1,4-Dichlorobenzene	<5
1,2-Dichlorobenzene	<5
Benzyl alcohol	<5
bis(2-chloroisopropyl)ether	<5
2-Methylphenol	13*
Hexachloroethane	<5
N-nitroso-di-n-propylamine	<5
4-Methylphenol	<25
Nitrobenzene	<5
Isophorone	<5
2-Nitrophenol	<25
2,4-Dimethylphenol	15*
bis(2-Chloroethoxy)methane	<5
2,4-Dichlorophenol	<25
1,2,4-Trichlorobenzene	<5
Naphthalene	<5
Hexachlorobutadiene	<5
4-Chloro-3-methylphenol	<25
2-Methylnaphthalene	<5
Hexachlorocyclopentadiene	<6
2,4,6-Trichlorophenol	<25
2,4,5-Trichlorophenol	<25
2-Chloronaphthalene	<5
Dimethylphthalate	<5
Acenaphthylene	<5
2,6-Dinitrotoluene	<5
Acenaphthene	<5
2,4-Dinitrophenol	<25
Dibenzofuran	<5
2,4-Dinitrotoluene	<5
4-Nitrophenol	<25
Diethylphthalate	<5
Fluorene	<5
4-Chlorophenyl-phenylether	<5
n-Nitrosodiphenylamine	<5
4,6-Dinitro-2-methylphenol	<25
4-Bromophenyl-phenylether	<5
Hexachlorobenzene	<5

**Friedman & Bruya, Inc.**

3012 16th Avenue West  
 Seattle, WA 98119  
 (206) 285-8282

**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53146
Client ID: RW	Date Analyzed: 10/13/94	Units: ug/L (ppb)
Pentachlorophenol	<25	
Phenanthrene	<5	
Anthracene	<5	
Di-n-butylphthalate	<5	
Fluoranthene	<5	
Pyrene	<5	
Butylbenzylphthalate	26	
Benzo[a]anthracene	<5	
Chrysene	<5	
bis(2-Ethylhexyl)phthalate	55	
Di-n-octylphthalate	52	
Benzo(a)pyrene	<5	
Benzo(b)fluoranthene	<5	
Benzo(k)fluoranthene	<5	
Indeno(1,2,3-cd)pyrene	<5	
Dibenz(a,h)anthracene	<5	
Benzo(g,h,i)perylene	<5	

**Surrogate Recoveries:**

	QC Limits	
2-Fluorophenol	25-121	35%
Phenol-d6	24-113	27%
Nitrobenzene-d5	23-120	96%
2-Fluorobiphenyl	30-115	0%
2,4,6-Tribromophenol	19-122	156%
Terphenyl-d14	18-137	14%

\* Analyte below established detection limit. Reported as an estimate due to a positive spectral match.

FRIEDMAN & BRUYA, INC.  
ENVIRONMENTAL CHEMISTSAndrew John Friedman  
James E. Bruya, Ph.D.  
(206) 285-82823012 16th Avenue West  
Seattle, WA 98119  
FAX: (206) 283-5044

## TRANSMITTAL

DATE: ~~10/11/94~~ 10/12/94

TO: Alon Lipstick

COMPANY: The Johnson Company PROJECT NAME#:

FAX #: 1802 229 5871 PHONE #:

FROM:

We are sending you: ☐ Attached ☐ Under separate cover via# Copies/Pages  
(including cover sheet)

Description

16

These are transmitted as indicated:

☐ For your use ☐ For review and comment ☐ For your signature and return  
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Remarks:

Original: Will Follow ☐ Will Not Follow ☐

**FRIEDMAN & BRUYA, INC.****ENVIRONMENTAL CHEMISTS**

Andrew John Friedman  
James E. Bruya, Ph.D.  
(206) 285-8282

3012 16th Avenue West  
Seattle, WA 98119-2029  
FAX: (206) 283-5044

October 11, 1994

Ralph Deveraux, Project Leader  
The Caladonia Oil Company  
99 Main Street  
Lyndonville, VT 05851

Dear Mr. Deveraux:

Enclosed are the results from the testing of material submitted on September 22, 1994 from your project #1-0393-3.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Bradley T. Benson  
Chemist

jdp

Enclosures

c: Karl Johnson  
The Johnson Company

**Friedman & Bruya, Inc.**

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Seattle, WA 98119

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: Blank
Client ID: Method Blank	Date Analyzed: 10/06/94	Units: ug/L (ppb)

Phenol	<5
bis(2-Chloroethyl)ether	<1
2-Chlorophenol	<5
1,3-Dichlorobenzene	<1
1,4-Dichlorobenzene	<1
1,2-Dichlorobenzene	<1
Benzyl alcohol	<1
bis(2-chloroisopropyl)ether	<1
2-Methylphenol	<5
Hexachloroethane	<1
N-nitroso-di-n-propylamine	<1
4-Methylphenol	<5
Nitrobenzene	<1
Isophorone	<1
2-Nitrophenol	<5
2,4-Dimethylphenol	<5
bis(2-Chloroethoxy)methane	<1
2,4-Dichlorophenol	<5
1,2,4-Trichlorobenzene	<1
Naphthalene	<1
Hexachlorobutadiene	<1
4-Chloro-3-methylphenol	<5
2-Methylnaphthalene	<1
Hexachlorocyclopentadiene	<1
2,4,6-Trichlorophenol	<5
2,4,5-Trichlorophenol	<5
2-Chloronaphthalene	<1
Dimethylphthalate	<1
Acenaphthylene	<1
2,6-Dinitrotoluene	<1
Acenaphthene	<1
2,4-Dinitrophenol	<5
Dibenzofuran	<1
2,4-Dinitrotoluene	<1
4-Nitrophenol	<5
Diethylphthalate	<1
Fluorene	<1
4-Chlorophenyl-phenylether	<1
n-Nitrosodiphenylamine	<1
4,6-Dinitro-2-methylphenol	<5
4-Bromophenyl-phenylether	<1
Hexachlorobenzene	<1



**Friedman & Bruya, Inc.**

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: Blank
Client ID: Method Blank	Date Analyzed: 10/06/94	Units: ug/L (ppb)
Pentachlorophenol		<5
Phenanthrene		<1
Anthracene		<1
Di-n-butylphthalate		<1
Fluoranthene		<1
Pyrene		<1
Butylbenzylphthalate		<1
Benzo[a]anthracene		<1
Chrysene		<1
bis(2-Ethylhexyl)phthalate		<1
Di-n-octylphthalate		<1
Benzo(a)pyrene		<1
Benzo(b)fluoranthene		<1
Benzo(k)fluoranthene		<1
Indeno(1,2,3-cd)pyrene		<1
Dibenz(a,h)anthracene		<1
Benzo(g,h,i)perylene		<1

**Surrogate Recoveries:**

	QC Limits	
2-Fluorophenol	21-110	12%*
Phenol-d6	10-110	11%*
Nitrobenzene-d5	35-114	0%*
2-Fluorobiphenyl	43-116	0%*
2,4,6-Tribromophenol	10-123	12%*
Terphenyl-d14	33-141	32%*

\*Surrogate recoveries are believed to be out due to a faulty syringe technique that failed to inject or partially injected the surrogates when they were added. The blank was void of contaminants and the internal standards were correctly measured and quantified while other blanks that were run this same day ran successfully.

**Friedman & Bruya, Inc.**

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53146
Client ID: RW	Date Analyzed: 10/06/94	Units: ug/L (ppb)

Phenol	ip
bis(2-Chloroethyl)ether	ip
2-Chlorophenol	ip
1,3-Dichlorobenzene	ip
1,4-Dichlorobenzene	ip
1,2-Dichlorobenzene	ip
Benzyl alcohol	ip
bis(2-chloroisopropyl)ether	ip
2-Methylphenol	ip
Hexachloroethane	ip
N-nitroso-di-n-propylamine	ip
4-Methylphenol	ip
Nitrobenzene	ip
Isophorone	ip
2-Nitrophenol	ip
2,4-Dimethylphenol	ip
bis(2-Chloroethoxy)methane	ip
2,4-Dichlorophenol	ip
1,2,4-Trichlorobenzene	ip
Naphthalene	ip
Hexachlorobutadiene	ip
4-Chloro-3-methylphenol	ip
2-Methylnaphthalene	ip
Hexachlorocyclopentadiene	ip
2,4,6-Trichlorophenol	ip
2,4,6-Trichlorophenol	ip
2-Chloronaphthalene	ip
Dimethylphthalate	ip
Acenaphthylene	ip
2,6-Dinitrotoluene	ip
Acenaphthene	ip
2,4-Dinitrophenol	ip
Dibenzofuran	ip
2,4-Dinitrotoluene	ip
4-Nitrophenol	ip
Diethylphthalate	ip
Fluorene	ip
4-Chlorophenyl-phenylether	ip
n-Nitrosodiphenylamine	ip
4,6-Dinitro-2-methylphenol	ip
4-Bromophenyl-phenylether	ip
Hexachlorobenzene	ip

**Friedman & Bruya, Inc.**

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53146
Client ID: RW	Date Analyzed: 10/06/94	Units: ug/L (ppb)
Pentachlorophenol		ip
Phenanthrene		ip
Anthracene		ip
Di-n-butylphthalate		ip
Fluoranthene		ip
Pyrene		ip
Butylbenzylphthalate		ip
Benzo(a)anthracene		ip
Chrysene		ip
bis(2-Ethylhexyl)phthalate		ip
Di-n-octylphthalate		ip
Benzo(a)pyrene		ip
Benzo(b)fluoranthene		ip
Benzo(k)fluoranthene		ip
Indeno(1,2,3-cd)pyrene		ip
Dibenz(a,h)anthracene		ip
Benzo(g,h,i)perylene		ip

**Surrogate Recoveries:**

	QC Limits	
2-Fluorophenol	21-110	ip
Phenol-d6	10-110	ip
Nitrobenzene-d5	35-114	ip
2-Fluorobiphenyl	43-116	ip
2,4,6-Tribromophenol	10-123	ip
Terphenyl-d14	33-141	ip

ip) A demonstrated matrix effect prevented the recovery of the internal standards which prevents the quantitation and identification of all analytes.

**Friedman & Bruya, Inc.**

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53149
Client ID: CAL-1	Date Analyzed: 10/06/94	Units: ug/L (ppb)

Phenol	<5
bis(2-Chloroethyl)ether	<1
2-Chlorophenol	<5
1,3-Dichlorobenzene	<1
1,4-Dichlorobenzene	<1
1,2-Dichlorobenzene	<1
Benzyl alcohol	<1
bis(2-chloroisopropyl)ether	<1
2-Methylphenol	<5
Hexachloroethane	<1
N-nitroso-di-n-propylamine	<1
4-Methylphenol	<5
Nitrobenzene	<1
Isophorone	<1
2-Nitrophenol	<5
2,4-Dimethylphenol	<5
bis(2-Chloroethoxy)methane	<1
2,4-Dichlorophenol	<5
1,2,4-Trichlorobenzene	<1
Naphthalene	6
Hexachlorobutadiene	<1
4-Chloro-3-methylphenol	<5
2-Methylnaphthalene	7
Hexachlorocyclopentadiene	<1
2,4,6-Trichlorophenol	<5
2,4,5-Trichlorophenol	<5
2-Chloronaphthalene	<1
Dimethylphthalate	<1
Acenaphthylene	<1
2,6-Dinitrotoluene	<1
Acenaphthene	1
2,4-Dinitrophenol	<5
Dibenzofuran	<1
2,4-Dinitrotoluene	<1
4-Nitrophenol	<5
Diethylphthalate	<1
Fluorene	<1
4-Chlorophenyl-phenylether	<1
n-Nitrosodiphenylamine	<1
4,6-Dinitro-2-methylphenol	<5
4-Bromophenyl-phenylether	<1
Hexachlorobenzene	<1

**Friedman & Bruya, Inc.**

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53149
Client ID: CAL-1	Date Analyzed: 10/06/94	Units: ug/L (ppb)
Pentachlorophenol		<5
Phenanthrene		1
Anthracene		<1
Di-n-butylphthalate		<1
Fluoranthene		<1
Pyrene		<1
Butylbenzylphthalate		<1
Benzo(a)anthracene		<1
Chrysene		<1
bis(2-Ethylhexyl)phthalate		9
Di-n-octylphthalate		<1
Benzo(a)pyrene		<1
Benzo(b)fluoranthene		<1
Benzo(k)fluoranthene		<1
Indeno(1,2,3-cd)pyrene		<1
Dibenz(a,h)anthracene		<1
Benzo(g,h,i)perylene		<1

**Surrogate Recoveries:**

	QC Limits	
2-Fluorophenol	21-110	31%
Phenol-d6	10-110	23%
Nitrobenzene-d5	35-114	56%
2-Fluorobiphenyl	43-116	51%
2,4,6-Tribromophenol	10-123	73%
Terphenyl-d14	33-141	55%

**Friedman & Bruya, Inc.**

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53149
Client ID: CAL-2	Date Analyzed: 10/06/94	Units: ug/L (ppb)

Phenol	<5
bis(2-Chloroethyl)ether	<1
2-Chlorophenol	<5
1,3-Dichlorobenzene	<1
1,4-Dichlorobenzene	<1
1,2-Dichlorobenzene	<1
Benzyl alcohol	<1
bis(2-chloroisopropyl)ether	<1
2-Methylphenol	<5
Hexachloroethane	<1
N-nitroso-di-n-propylamine	<1
4-Methylphenol	<5
Nitrobenzene	<1
Isophorone	<1
2-Nitrophenol	<5
2,4-Dimethylphenol	<5
bis(2-Chloroethoxy)methane	<1
2,4-Dichlorophenol	<5
1,2,4-Trichlorobenzene	<1
Naphthalene	24
Hexachlorobutadiene	<1
4-Chloro-3-methylphenol	<5
2-Methylnaphthalene	<1
Hexachlorocyclopentadiene	<1
2,4,6-Trichlorophenol	<5
2,4,5-Trichlorophenol	<5
2-Chloronaphthalene	<1
Dimethylphthalate	<1
Acenaphthylene	<1
2,6-Dinitrotoluene	<1
Acenaphthene	7
2,4-Dinitrophenol	<5
Dibenzofuran	5
2,4-Dinitrotoluene	<1
4-Nitrophenol	<5
Diethylphthalate	<1
Fluorene	8
4-Chlorophenyl-phenylether	<1
n-Nitrosodiphenylamine	<1
4,6-Dinitro-2-methylphenol	<5
4-Bromophenyl-phenylether	<1
Hexachlorobenzene	<1

**Friedman & Bruya, Inc.**

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53149
Client ID: CAL-2	Date Analyzed: 10/06/94	Units: ug/L (ppb)
Pentachlorophenol	<5	
Phenanthrene	7	
Anthracene	<1	
Di-n-butylphthalate	<1	
Fluoranthene	<1	
Pyrene	<1	
Butylbenzylphthalate	<1	
Benzo[a]anthracene	<1	
Chrysene	<1	
bis(2-Ethylhexyl)phthalate	4	
Di-n-octylphthalate	<1	
Benzo(a)pyrene	<1	
Benzo(b)fluoranthene	<1	
Benzo(k)fluoranthene	<1	
Indeno(1,2,3-cd)pyrene	<1	
Dibenz(a,h)anthracene	<1	
Benzo(g,h,i)perylene	<1	

**Surrogate Recoveries:**

	QC Limits	
2-Fluorophenol	21-110	46%
Phenol-d6	10-110	23%
Nitrobenzene-d5	35-114	76%
2-Fluorobiphenyl	43-116	79%
2,4,6-Tribromophenol	10-123	109%
Terphenyl-d14	33-141	76%

**Friedman & Bruya, Inc.**

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53151
Client ID: CAL-3	Date Analyzed: 10/06/94	Units: ug/L (ppb)

Phenol	<5
bis(2-Chloroethyl)ether	<1
2-Chlorophenol	<5
1,3-Dichlorobenzene	<1
1,4-Dichlorobenzene	<1
1,2-Dichlorobenzene	<1
Benzyl alcohol	<1
bis(2-chloroisopropyl)ether	<1
2-Methylphenol	<5
Hexachloroethane	<1
N-nitroso-di-n-propylamine	<1
4-Methylphenol	<5
Nitrobenzene	<1
Isophorone	<1
2-Nitrophenol	<5
2,4-Dimethylphenol	<5
bis(2-Chloroethoxy)methane	<1
2,4-Dichlorophenol	<5
1,2,4-Trichlorobenzene	<1
Naphthalene	6
Hexachlorobutadiene	<1
4-Chloro-3-methylphenol	<5
2-Methylnaphthalene	<1
Hexachlorocyclopentadiene	<1
2,4,6-Trichlorophenol	<5
2,4,5-Trichlorophenol	<5
2-Chloronaphthalene	<1
Dimethylphthalate	<1
Acenaphthylene	<1
2,6-Dinitrotoluene	<1
Acenaphthene	<1
2,4-Dinitrophenol	<5
Dibenzofuran	<1
2,4-Dinitrotoluene	<1
4-Nitrophenol	<5
Diethylphthalate	<1
Fluorene	1
4-Chlorophenyl-phenylether	<1
n-Nitrosodiphenylamine	<1
4,6-Dinitro-2-methylphenol	<5
4-Bromophenyl-phenylether	<1
Hexachlorobenzene	<1



**Friedman & Bruya, Inc.**

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53151
Client ID: CAL-3	Date Analyzed: 10/06/94	Units: ug/L (ppb)
Pentachlorophenol		<5
Phenanthrene		1
Anthracene		<1
Di-n-butylphthalate		<1
Fluoranthene		<1
Pyrene		<1
Butylbenzylphthalate		<1
Benzo(a)anthracene		<1
Chrysene		<1
bis(2-Ethylhexyl)phthalate		2
Di-n-octylphthalate		<1
Benzo(a)pyrene		<1
Benzo(b)fluoranthene		<1
Benzo(k)fluoranthene		<1
Indeno(1,2,3-cd)pyrene		<1
Dibenz(a,h)anthracene		<1
Benzo(g,h,i)perylene		<1

**Surrogate Recoveries:**

	QC Limits	
2-Fluorophenol	21-110	17%*
Phenol-d6	10-110	12%
Nitrobenzene-d5	35-114	52%
2-Fluorobiphenyl	43-116	52%
2,4,6-Tribromophenol	10-123	77%
Terphenyl-d14	33-141	54%

\*One acid surrogate allowed to be out of range per the method.

**Friedman & Bruya, Inc.**

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53153
Client ID: JCO-2	Date Analyzed: 10/06/94	Units: ug/L (ppb)

Phenol	<5
bis(2-Chloroethyl)ether	<1
2-Chlorophenol	<5
1,3-Dichlorobenzene	<1
1,4-Dichlorobenzene	<1
1,2-Dichlorobenzene	<1
Benzyl alcohol	<1
bis(2-chloroisopropyl)ether	<1
2-Methylphenol	<5
Hexachloroethane	<1
N-nitroso-di-n-propylamine	<1
4-Methylphenol	<5
Nitrobenzene	<1
Isophorone	<1
2-Nitrophenol	<5
2,4-Dimethylphenol	<5
bis(2-Chloroethoxy)methane	<1
2,4-Dichlorophenol	<5
1,2,4-Trichlorobenzene	<1
Naphthalene	<1
Hexachlorobutadiene	<1
4-Chloro-3-methylphenol	<5
2-Methylnaphthalene	<1
Hexachlorocyclopentadiene	<1
2,4,6-Trichlorophenol	<5
2,4,5-Trichlorophenol	<5
2-Chloronaphthalene	<1
Dimethylphthalate	<1
Acenaphthylene	<1
2,6-Dinitrotoluene	<1
Acenaphthene	<1
2,4-Dinitrophenol	<5
Dibenzofuran	<1
2,4-Dinitrotoluene	<1
4-Nitrophenol	<5
Diethylphthalate	<1
Fluorene	<1
4-Chlorophenyl-phenylether	<1
n-Nitrosodiphenylamine	<1
4,6-Dinitro-2-methylphenol	<5
4-Bromophenyl-phenylether	<1
Hexachlorobenzene	<1

**Friedman & Bruya, Inc.**

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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53153
Client ID: JCO-2	Date Analyzed: 10/06/94	Units: ug/L (ppb)
Pentachlorophenol	<5	
Phenanthrene	<1	
Anthracene	<1	
Di-n-butylphthalate	<1	
Fluoranthene	<1	
Pyrene	<1	
Butylbenzylphthalate	<1	
Benzo(a)anthracene	<1	
Chrysene	<1	
bis(2-Ethylhexyl)phthalate	<1	
Di-n-octylphthalate	<1	
Benzo(a)pyrene	<1	
Benzo(b)fluoranthene	<1	
Benzo(k)fluoranthene	<1	
Indeno(1,2,3-cd)pyrene	<1	
Dibenz(a,h)anthracene	<1	
Benzo(g,h,i)perylene	<1	

**Surrogate Recoveries:**

	QC Limits	
2-Fluorophenol	21-110	36%
Phenol-d6	10-110	26%
Nitrobenzene-d5	35-114	50%
2-Fluorobiphenyl	43-116	33%*
2,4,6-Tribromophenol	10-123	91%
Terphenyl-d14	33-141	65%

\*One base/neutral surrogate allowed to be out of range per the method.

**Friedman & Bruya, Inc.**

3012 16th Avenue West  
 Seattle, WA 98119  
 (206) 285-8282

**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53156
Client ID: JCO-3	Date Analyzed: 10/06/94	Units: ug/L (ppb)

Phenol	<5
bis(2-Chloroethyl)ether	<1
2-Chlorophenol	<5
1,3-Dichlorobenzene	<1
1,4-Dichlorobenzene	<1
1,2-Dichlorobenzene	<1
Benzyl alcohol	<1
bis(2-chloroisopropyl)ether	<5
2-Methylphenol	<1
Hexachloroethane	<1
N-nitroso-di-n-propylamine	<5
4-Methylphenol	<1
Nitrobenzene	<1
Isophorone	<5
2-Nitrophenol	<5
2,4-Dimethylphenol	<1
bis(2-Chloroethoxy)methane	<5
2,4-Dichlorophenol	<1
1,2,4-Trichlorobenzene	<1
Naphthalene	<1
Hexachlorobutadiene	<5
4-Chloro-3-methylphenol	<1
2-Methylnaphthalene	<1
Hexachlorocyclopentadiene	<5
2,4,6-Trichlorophenol	<5
2,4,5-Trichlorophenol	<1
2-Chloronaphthalene	<1
Dimethylphthalate	<1
Acenaphthylene	<1
2,6-Dinitrotoluene	<1
Acenaphthene	<5
2,4-Dinitrophenol	<1
Dibenzofuran	<1
2,4-Dinitrotoluene	<5
4-Nitrophenol	<1
Diethylphthalate	<1
Fluorene	<1
4-Chlorophenyl-phenylether	<1
n-Nitrosodiphenylamine	<5
4,6-Dinitro-2-methylphenol	<1
4-Bromophenyl-phenylether	<1
Hexachlorobenzene	<1

**Friedman & Bruya, Inc.**

3012 16th Avenue West  
Seattle, WA 98119  
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**Semivolatile Results by Method 8270**

Client: The Johnson Company, Inc.	Date Received: 09/22/94	Analyst: kwilt
Project: Caledonia Oil	Date Extracted: 09/29/94	FBI ID #: 53156
Client ID: JCO-3	Date Analyzed: 10/06/94	Units: ug/L (ppb)
Pentachlorophenol		<5
Phenanthrene		<1
Anthracene		<1
Di-n-butylphthalate		<1
Fluoranthene		<1
Pyrene		<1
Butylbenzylphthalate		<1
Benzo(a)anthracene		<1
Chrysene		<1
bis(2-Ethylhexyl)phthalate		<1
Di-n-octylphthalate		<1
Benzo(a)pyrene		<1
Benzo(b)fluoranthene		<1
Benzo(k)fluoranthene		<1
Indeno(1,2,3-cd)pyrene		<1
Dibenz(a,h)anthracene		<1
Benzo(g,h,i)perylene		<1

**Surrogate Recoveries:**

	QC Limits	
2-Fluorophenol	21-110	33%
Phenol-d6	10-110	27%
Nitrobenzene-d5	35-114	44%
2-Fluorobiphenyl	43-116	29%*
2,4,6-Tribromophenol	10-123	87%
Terphenyl-d14	33-141	66%

\*One base/neutral surrogate allowed to be out of range per the method.

## Spike Recovery and RPD Summary Report - WATER

Method : C:\HPCHEM\GCMS2\METHODS\8270A.M  
 Title : Semivolatiles by SW-846 Method 8270  
 Last Update : Fri Oct 07 10:22:56 1994  
 Response via : Continuing Calibration

Non-Spiked Sample: 100606.D

Spike  
Sample

Spike  
Duplicate Sample

File ID : 100608.D  
 Sample : DI MS  
 Acq Time: 6 Oct 94 11:41 pm

100609.D  
 DI MSD  
 7 Oct 94 12:33 am

Compound	Sample Conc	Spike Added	Spike Res	Dup Res	Spike %Rec	Dup %Rec	RPD	QC RPD	Limits % Rec
Phenol	0.0	50	14	16	28	32	13	42	12-110
2-Chlorophenol	0.0	50	38	39	76	78	3	40	27-123
1,4-Dichlorobenzene	0.0	50	16	18	32#	36	13	28	35-97
N-nitroso-di-n-propy	0.0	50	42	44	84	88	5	38	41-116
1,2,4-Trichlorobenze	0.0	50	18	21	36#	42	17	28	39-98
4-Chloro-3-methylphe	0.0	50	42	43	84	86	2	42	23-97
Acenaphthene	0.0	50	38	41	76	82	8	31	46-118
2,4-Dinitrotoluene	0.0	50	48	50	96	100#	4	38	24-96
4-Nitrophenol	0.0	50	15	13	30	26	13	50	10-80
Pentachlorophenol	0.0	50	49	47	98	94	4	50	9-103
Pyrene	0.0	50	36	38	72	76	6	31	26-127

Data accepted since duplicate proved reproducible.

8270A.M

Mon Oct 10 10:15:56 1994

P.O. Box 339  
 Randolph, Vermont 05060-0339  
 (802) 728-6313

**RECEIVED**  
 SEP 23 1994  
 THE JOHNSON COMPANY  
 MONTPELIER, VT

1-0393-  
 RJS

### LABORATORY REPORT

CLIENT: Caledonia Oil  
 ADDRESS: 99 Main St.  
 Lyndonville, VT  
 SITE: Caledonia Bulk Oil Storage

LABORATORY NO: 4-2208  
 PROJECT NO: 78611  
 DATE OF SAMPLE: 8/24/94  
 DATE OF RECEIPT: 8/26/94  
 DATE OF REPORT: 9/16/94

### RESULTS

(Results expressed in milligrams per kilogram(mg/kg)(ppm))

	1 JCO-1	2 JCO-2	3 JCO-3
<b>Total Petroleum Hydrocarbons (TPH) Fuel Scan</b>			
<b>VOLATILES-8015</b>			
Gasoline	< 0.20	—	< 0.15
<b>SEMIVOLATILES-8100</b>			
Gasoline	< 20	< 20	< 20
Kerosene	< 10	< 10	< 10
Diesel Fuel (Fuel Oil #2)	< 10	33	< 10
Fuel Oil #4	< 10	< 10	< 10
<b>% SOLID</b>	74.8	74.5	90.7

Note: JCO-2 volatile diluted because of diesel contamination, 8100 value is lower.

EPA method 8100 & 8015 modified, SW-846, 3rd Edition, July, 1992.  
 Quantification as fuel with best fingerprint match.

cc: The Johnson Company  
 100 State Street  
 Montpelier, VT 05602  
 Attn: Karl Johnson

Respectfully submitted,

SCITEST, INC.

*Roderick J. Lamothe*  
 Roderick J. Lamothe  
 Laboratory Director



**SCITEST**  
LABORATORY SERVICES

P.O. Box 339  
Randolph, Vermont 05060-0339  
(802) 728-6313

## LABORATORY REPORT

CLIENT: Caledonia Oil  
ADDRESS: 99 Main St.  
Lyndonville, VT  
  
SITE: Caledonia Bulk Oil Storage

LABORATORY NO: 4-2214  
PROJECT NO: 78611  
DATE OF SAMPLE: 8/26/94  
DATE OF RECEIPT: 8/29/94  
DATE OF REPORT: 9/16/94

### RESULTS

(Results expressed in milligrams per kilogram(mg/kg)(ppm))

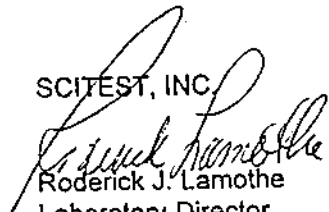
	1 JCO-4	2 JCO-4-3	3 JCO-5
<u>Total Petroleum Hydrocarbons (TPH) Fuel Scan</u>			
VOLATILES--8015			
Gasoline	< 0.15	0.16	< 0.15
SEMIVOLATILES--8100			
Gasoline	< 20		< 20
Kerosene	< 10		< 10
Diesel Fuel (Fuel Oil #2)	< 10		< 10
Fuel Oil #4	< 10		< 10
% SOLID	80.2	86.0	83.8

EPA method 8100 & 8015 modified, SW-846, 3rd Edition, July, 1992.  
Quantification as fuel with best fingerprint match.

cc: The Johnson Company  
100 State Street  
Montpelier, VT 05602  
Attn: Karl Johnson

Respectfully submitted,

SCITEST, INC.

  
Roderick J. Lamothe  
Laboratory Director